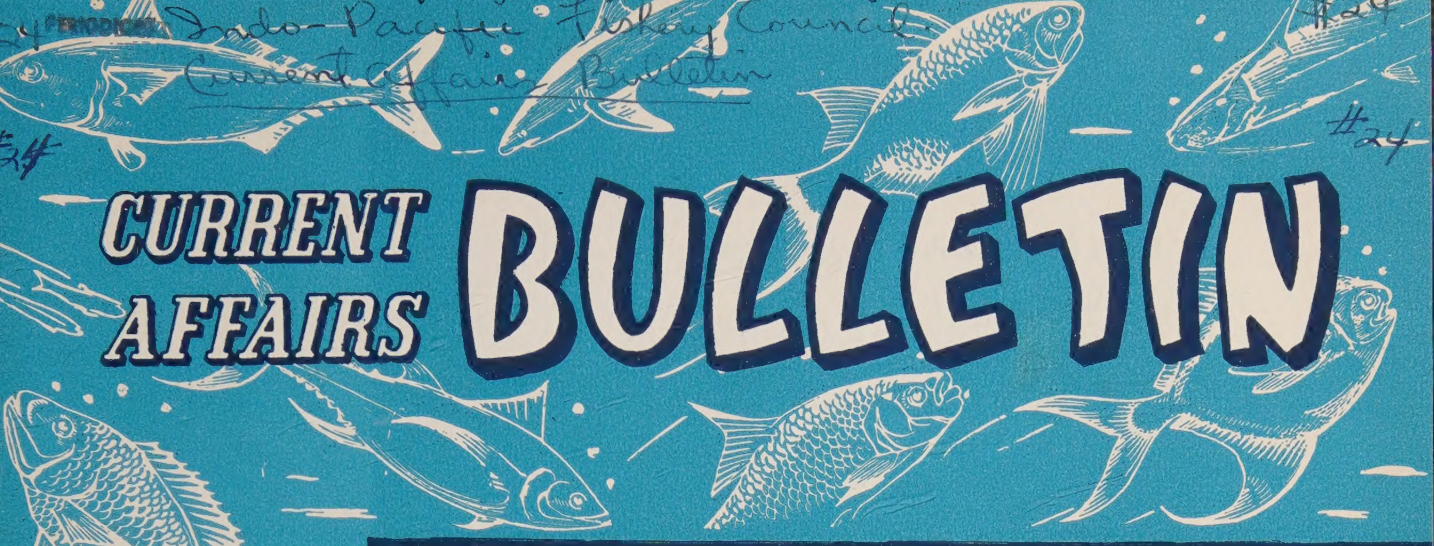

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THE BOAT AND THE BEACH *

A Symposium entitled "The Boat and the Beach" organized jointly by the Indo-Norwegian Project, Quilon, India, and the Government of India, was held at the Headquarters of the Indo-Norwegian Project between 3-8 March, 1958.

Participants at this Symposium were officers of the Government of India who are in charge of Technological aspects of the Craft and Gear development programme, technical officers of the State Departments of Fisheries who are concerned with the designs and construction of fishing boats and who are working as counterparts to FAO/ETAP Naval Architects on assignment in India. Two such Naval Architects, Messrs. Ziener and Gurtner also participated.

On special invitation from the Indo-Norwegian Project, Mr. Jan-Olof Traung, Chief of the Fishing Boat Section, FAO Fisheries Division, Rome, also participated.

The Symposium was organised primarily to assess the progress so far made in India in the development of a suitable surf boat and to consider further measures that would be necessary in this respect.

INTRODUCTION

Suitable sites for construction of fish harbours are restricted on both the East and West coasts of India. The fishing community is not concentrated at the few places where fish harbours could be constructed, instead it is scattered all along the two coasts. The construction of fish harbours in India is also likely to be a long-range project.

Fishermen today land their indigenous craft on the surf beaten beaches and haul them up manually right on the beach. The rapidly growing mechanization of fishing craft in India opened up the question of a possible mechanization of this class of vessels. Such mechanization is not, however, possible except with suitable and adequate modifications in the design.

Aware of this situation, the Government of India sought expert assistance from FAO for developing suitable surf-landing mechanized craft. Beginning in 1955 several models and prototypes were designed, constructed and tested. Results of such tests indicated the necessity for further work.

SURF CONDITION

The surf conditions both on the east and west coasts vary within wide limits. During the months of May to July and part of August, the sea is rough with heavy surfs on the west coast. The remaining 8 months are relatively calm. On the east coast, the sea is rough during March to December and calm only during January-February. However, the details of the surf, such as the type, height, period, number of breakers and the breaking distances for each breaker were not available.

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* This is a report abridged by the Council Secretariat from the official Summary Report on the Symposium of the same name organized in India in March, 1958. This abridged version has been approved by the Government of India.

TESTS AND TRIALS

During the Symposium, detailed tests for landing and launching were undertaken at the Sakthikulangara beach with three boats.

Beaching and movement along the beach were done with a tractor which could develop a maximum pull of 1,000 kg.

The technical details of the boats tested and the data obtained are recorded in the table below:

Results of launching and landing trials with three surf boats.

		BOATS		
		No. 5 (Indo-Norwegian Project)	INP–1 (Zimmer's Design)	Surf–1 (FAO Design)
1. Length (OA)		22'	25'	24'
2. Beam		6'-4"	8'-0	6'-10½"
3. Depth		2'-8½"	3'-6½"	2'-9"
4. Freeboard amidship		1'-3"	2'-3"	1'-7"
5. Turning circle		3L Starboard 2L Port	1.5L Starboard 2.5L Port	2L Starboard 3L Port
6. Roll period in seconds		1.8	2.02	2.06
7. Displacement in tons		2.1 approx.	2.1 approx.	2.02 approx.
8. Pull in kg.	(Sleepers	720 max.	1,000 max.	550 max.
	(	350	650	350
	(			
	(Rollers	250	700	–
	(	200	500	–
	(			
	(Sands	800	over 1,000 kg.	900
	(	600		850

NOTE: The above data do not include the results of trials conducted in Madras and Andhra by the FAO Naval Architects with their earlier designs (Mr. Ziener). A boat similar to 'Surf 1' was built in Ghana and tried on the beach there by Mr. P. Gurtner, FAO/ETAP Naval Architect. It was reported that the boat tested in Ghana was able to negotiate in a surf between 4-6 ft. without shipping water.

An aluminium dingy without motor and rubber rafts also tested during the Symposium for surf landing. The 'Surf 1' was moved to Trivandrum for trials on the beach there. The trials, however, were not undertaken as the surf condition there was only moderate.

The speed on the beach was estimated to 1-1½ft. per sec. The rollers had to be supported by longitudinal boards, as they otherwise showed tendency to sink into the sand.

'Surf 1' appears to be superior on the beach and in the surf, particularly the grabrails and the modest freeboard amidships made handling easy. It was evident that heavy surf could be negotiated with this boat without shipping any water over the bow.

'INP 1' was heavy even for a tractor. Launching was not possible without the aid of a buoy and pulley anchored some distance outside the surf.

Based on these trials and arising out of the discussions, various observations were made. These observations are recorded below:

DESIGN OF SURF BOAT

The design of the surf boat should take into consideration its shape and size, surf conditions, beach features, crew features and fishing features.

In respect of shape and size, it was agreed that the boat should have a fine bow, generous free board forward and fine buttock lines; engine and centre of gravity to be aft; a transom stern and hinged rudder would be cheaper and easier to get at; low deadrise or side keels for easy transport on beach; V bottom single chine hulls possibly of plywood construction may be attempted; beam not to be less than that of 'Surf 1', about 7 ft.; keels could be nearly straight, rounded more or less to get easier transport and turning on the beach, propeller position could be either at the side or at the centre; size of the boat will depend upon the nature of gear to be employed; special consideration should be given to beach landing qualities. The chief difficulty is in launching rather than in landing. Further tests should be made particularly to evolve a method by which surf boats could be launched with much less difficulty than hitherto experienced.

Skegs for protecting the propellers were discussed as were the possibilities of unusual types of propellers like Voith-Schneider, Gill Propeller and Hotch-Kiss cone propeller and Kitchner rudder. Protections from spray such as half decks, whale back, complete deck, self bailing cock pits, etc., were also considered.

As regards crew features, it was felt that there would always be sleeping possibilities on the deck of a boat of a size similar to that of 'Surf 1'. It would however be advisable to equip such boats with an awning which should be so cut as to be of use as a sail in case of emergency. It might prove useful to have a mast with a small sail placed in the aft part of the boat to keep the boat against waves, particularly in the case of hand lining. No cooking facilities were considered necessary. Fish boxes and insulated holds were also not considered essential. The boat should, however, be provided with a fairly efficient bilge pump. As far as life saving appliances were concerned, it was felt that if mechanised beach fishing was organized on large scale, in addition to life buoys and jackets, there should be some organised life saving service.

Relating to fishing features there was general agreement that any practical beach boat should at least have the same fishing qualities, as if not more than, a 22' 'Dan' boat, or a 24' 'Pablo' boat or a 25' INP Boat. The fishing methods for a surf boat should be gill nets, drift

nets, hand lines, trolling lines and small 'two boat' purse seines. Trawling was considered not economical. It was therefore agreed that a complicated winch will not be necessary and that a mechanical line hauler for longlining and a hand driven purse seine winch should be more than ample.

ENGINES

In respect of engines, the consensus of opinion was that they should not only be reliable, but also light. The propeller should have the optional diameter *i.e.* a size suitable for the stern construction and which will not materially affect the boat qualities. Sea water cooling system was considered dangerous and even fresh water cooling system although giving a wider range of selection of engines, was considered as not practical. Air cooled engines would be more suitable and safer. A fixed pitch propeller with reverse gear was considered more suitable for a surf boat.

The installation of the engine, propeller selection,periodic repairs and maintenance routine were considered and it was agreed that these aspects should be given due importance.

The 15-18 H.P. trial engine used in 'Surf 1' was considered to be on the large side. A 10 H.P. engine would suffice.

GENERAL

It was agreed that the general economy of mechanised beach landing craft, not only with regard to hull and engine, but also pertaining to maintenance and expected earnings should be looked into in detail. The question of standardisation of hull and machinery to reduce costs has to be investigated. It was however agreed that until a more satisfactory surf boat has been developed and has proved itself in service, it would be premature to consider mass production of these boats and matters pertaining to such large scale production.

FUTURE LINE OF ACTION

It was decided to request the cooperation of the Central Water and Power Research Station, Poona, in conducting model tests for the surf boats already designed and in conducting a survey of the surf conditions.

It was recommended that model tests should be conducted for the following designs:

(i) F.A.O. Surf 1 – with transom stern

(ii) F.A.O. Surf 2 – with cruiser stern (new design to be made)

(iii) F.A.O. Surf 1 – with more beam (new design to be made)

(iv) Indo-Norwegian Project 22' boat (No. 5)

(v) Mr. Ziener's 20' surf boat

(vi) Mr. Ziener's 22' surf boat (new design to be made)

(vii) Mr. Zimmer's plywood boat

It was also suggested that beach trials with 'Surf 1' may be conducted at selected centres on the East coast.

It was decided that basic data on the surf conditions would be collected at selected points on both the coasts. A suitable questionnaire in this respect was approved and handed over to participants for collection of field data (Appendix).

It was also decided to recommend for a subsequent meeting of the participants after the survey and model test.

APPENDIX

Questionnaire of Surf Observations

Prepared by Shri P.K. Kulkarni of the Central Water and Power Research Station, Poona, India.

1. Purpose:

A beach landing boat, capable of negotiating surfs, seems to be a necessity along many coastal regions. The question naturally arises as to what surf heights occur along different parts of the coast during a year. This information will not be only useful to the designer, but will be also useful for working out the economic possibilities of such a boat.

2. Selection of observation points:

Participants in the Symposium gave the following names and places where daily surf observations could be carried out.

Bombay

1. Mandavi
2. Veraval
3. Ratnagiri

Mysore

1. Karwar
2. Malpe
3. Mangalore

Kerala

1. Kasargode
2. Quilandy
3. Beypore
4. Azhikode
5. Cochin
6. Vizhinjam
7. Puthenthura or Sakthikulangara

Madras

1. Cape Comorin
2. Cuddalore
3. Madras

West Bengal

1. Digha

Andhra

1. Vulakuru
2. Nizampatnam
3. Peddapatnam
4. Uppada
5. Calingapatam

3. Observations:

Observations are to be taken daily at a fixed convenient time. Surf heights should, however, be preferably observed at the high tide on new and full moon days. The tabular form in which the information should be collected is given.

Surf Observations

Place District State

Date	Time	Direction of unbroken waves	Breaker Information: 1st breaker Dist. ft.	1st breaker 'h' ft.	II Dist. ft.	II 'h' ft.	III	IV	V
1	2	3	4	5	6	7	8	9	10

11	12	13	Condition of fishing	State of tide	Wind Direction	Wind Velocity M/hr.	Remarks: What total number of craft could operate
			14	15	16	17	18

14. Condition of fishing:

A – Little or no surf – 1st breaker 2 ft. high – boats could pass surf very easily.
B – Mild surf – 1st breaker 2 – 4 ft. high – with some difficulty.
C – Pronounced surf – „ „ 4 – 7 „ „ – difficult to cross the surf.
D – Heavy surf – „ „ above 7 „ „ – dangerous to cross the surf.

15. State of tide:

High tide
Low tide
Mid high tide
Mid low tide

4. Instruction for making observations:

When a wave* approaches the shore, its surface undergoes transformation and on further advancing towards

* Copies of the figures showing the various types of waves and breakers are available with the Assistant Director, Craft and Gear Section, Central Fisheries Technological Station, Cochin, S. India.

the shore, the wave becomes unstable causing a breaker.

During heavy wave action, a wave would again form after the first breaker line giving rise to second or third breaker lines. This forms a surf zone near the shore.

We are interested in the surf zone particularly, if a series of breakers occurs.

First observe how many breakers lines are there. Do not consider the breakers very near the water line which are generally caused by the returning wave wash. Judge the distances of breakers L_1, L_2, L_3, etc. Surf height 'h' is then to be observed for each breaker line. Watch each breaker line for two minutes and record the highest breaker height observed.

While beginning to collect such data the following information about the place of observation is desirable :

(i) Type and size of local boats and their number operating in the region.

(ii) Cross section of the beach at least up to 10 ft. below mean sea level.

NOTE ON THE PRESENT POSITION REGARDING THE DEVELOPMENT OF A SURF GOING BEACH LANDING FISHING BOAT IN INDIA

Prepared by
Fisheries Division, FAO, Rome.

It may be recalled that the efforts to evolve a "safe" surf going, beach landing fishing boat were resumed by FAO about two years ago after a break of almost 2 years.

A radically new type of boat was then designed at Headquarters, and after subsequent changes two prototypes of this boat were built—one at Sekondi, Ghana, West Africa and one by the Indo-Norwegian Foundation in Norway. Both boats were powered by aircooled 15-18 h.p. Enfield diesels.

The Ghana boat was tested by Mr. Peter Gurtner, FAO Naval Architect, when he visited Ghana in January and February 1958. While the surf at that time of the year was not very marked, the boat clearly revealed her superior qualities over earlier types. She would negotiate any surf that could be found at the time (breakers between 3 and 5 ft. high) and handled very well even when riding in on a breaking wave (very little tendency to broach to). The main drawback of the boat was her weight which made it difficult to handle her on the beach with few men only and no mechanical gear. Another difficulty was presented by the off-centre installation of the engine, which made it necessary to change the steering arrangement and hang the rudder on the side, behind the propeller. Later in the year, the boat was again thoroughly tested in much higher surf by Mr. R. T. Bentley, General Manager of A.D.C. Boatyards Ltd.

Sekondi. Mr. Bentley reported that the boat handled very well, and with an experienced crew should be able to do very well from surf-beaten beaches. His main criticism was the low freeboard amidships and too short a foredeck. These two factors resulted in the boat shipping rather a lot of water, which had to be pumped out each time she crossed the surf.

The boat of the Indo-Norwegian Project (INP), Quilon, India 'Surf 1' was first tested in Quilon in March this year. A symposium was held at the time in Quilon, discussing questions pertinent to beach landing boats and particularily beach boats of the surf going type. While again the surf conditions were not allowing any conclusive surf going tests, the boat nevertheless showed very promising performance. Again the main objections to the design were the weight, the low freeboard and the inadequacy of pumping arrangements. During the symposium a set of recommended changes were drawn up, and Mr. Gurtner was instructed to work these into a new design, together with experiences from the subsequent testing of 'Surf 1'.

A second set of tests was run at Tuticorin, India in June 1958 when the surf was appreciably higher, and furthermore the beach at the testing place was very steep. The boat was under the command of Mr. Christensen of INP, and the crew were experienced instructors of INP. During these tests the boat received some very heavy blows and general rough handling, but stood up to it extremely well. Later in the summer the boat was used at Tuticorin and Nagapattinam, India for actual fishing operations. These proved successful, although the crew complained again about the low freeboard and the trouble of having to pump her dry all the time. Unfortunately not much heavy surf was encountered by the boat during that time, so that the surf going data are rather scarce up to now. This boat was lost in a freak storm outside Madras Harbour in October. Only the engine could be salvaged.

In early summer of 1958 the Government of Madras decided to build a surf boat to this FAO design, and Mr. Gurtner was asked to prepare drawings, incorporating the changes and suggestions resulting from the Ghana and Quilon trials. No great efforts at saving weight were made, as it was felt that as an experimental boat she should be of maximum strength, and that beach handling as such would have to be developed after the boat had proven to be successful in the water. The boat is at present nearing completion in Madras, and it is hoped to hold the first sea trial early in 1959. Due to the unavailability of carpenters experienced in clinker building, the boat was constructed with carved planking, certain scantlings being increased to account for the difference in strength of the two methods. This boat will be powered by a 10 h.p. air-cooled Parsons Goosander Diesel. The boat has been given more beam, substantially more freeboard and a longer foredeck. One engine driven pump and two hand pumps will be installed.

A comprehensive boat building and testing programme has recently been agreed upon by the Government of India, and INP in Quilon. This programme if fully implemented, should bring the construction of 4 more boats. Two of these will be conventionally clinker built, while one will be a single

chine boat built to a new and very promising method employing plywood and fibre glass, and the fourth will be a double chine plywood boat. In addition, FAO have agreed to ship the Ghana boat to India, so that together with the boat under construction at Madras, there should be six boats available for testing early in 1959.

Experience has shown that 'catamaran' fishermen do not easily take to these mechanised boats, unless under close supervision. The main reason for this is probably the fact that beach landing through surf with a boat requires a technique very different from landing catmarans, and fishermen must first be instructed in this technique, before they are given boats to use. The six boats mentioned above will therefore also be used to train a number of fishermen from various localities on India's surf beaten coast line, prior to these boats being introduced in these localities.

Plywood boats are now being introduced for two main reasons. It has long been realised that surf boats can only be introduced successfully in great number, if their price is brought down substantially, which again necessitates mass production. Plywood boats can easily be mass produced; however, the boats have to be of somewhat different form, they have to be of the single-or multi-chine type with straight sections.

Furthermore, a mass-produced plywood boat will be much lighter than a conventionally built hull, while having equal or more strength. Thus the problem handling the boats on the beach will be nearer its solution.

The boats to be built now are of the following main dimensions:

L/oa 24' – 0"
B/max 7' – 6½"
T/aft 1' – 10"

Displacement: conventional boat – approx. 2.0 tons; plywood boats approx. 1.3 tons;

Loading capacity: conventional – approx. 1.0 tons; plywood approx. 1.5 tons.

Power: 10 h.p., air-cooled marine diesel.

(i) The bigger a surf boat, the safer its operation through surf.

(ii) Beaching operations suggest an upper limit of about 2 tons of weight.

(iii) Price of the boat will, even with mass production, be much higher than the price of a catamaran.

(iv) Fishing capacity has to be many times greater than that of a catamaran.

(v) It was found by experience, that boats of 18' and 20' length would not have sufficient capacity.

(vi) Over all length of 24' was considered to meet most requirements, and to give a boat of reasonable weight and price, if mass produced.

Why are the designs not made public as yet? It is safe to assume that the success of such a development programme stands and falls with the release of only a thoroughly tried design. Building and introduction of untried designs could harm the development tremendously if the boats were found to be unsuitable for the work they have to

perform. It was decided to work on this problem in fair seclusion, and only release the final design to anybody who has an interest in surf boat operation.

It is very difficult to make any promises in this connection, but it is confidently assumed that next year will bring about a decision on the final type of design to be adopted. Once this is done, there will be no difficulty for any body to obtain the drawings of the boat. However, a word of warning must be added here: As mentioned above, the introduction of surf boats should only be done after careful training of the fishermen who are going to operate the boats. Furthermore, it would be of advantage, if boats could be introduced in batches in selected localities, to effectively teach the fishermen the importance of team work in surf boat operations.

The following paragraph is a suggestion for the interested parties in the Indo-Pacific region for preparing the ground for later introduction of the surf boats:

a. It would be important to know how many boats could be absorbed in any one country or locality to determine the possibility of mass production. To arrive at this, the number of fishermen at present engaged in fishing from catamarans or dug-outs from surf beaten beaches must be known.

b. Observations on the type and height of surf and the type of beach (steep, flat, soft sand, hard sand, gravel) over an extended period of time (one year at least is suggested) must be made and should be forwarded to the Naval Architects in charge of the surf boat project through the FAO Regional Office, or directly. This information will enable the Naval Architects to decide whether the boat evolved in India will also be suitable in other areas, or whether distinct changes will have to be introduced.

c. At the outset of any large scale programme of surf boat introduction, a small number of boats should again be tried in any new locality or area, to determine beyond doubt the suitability of the type. Large scale introduction of not completely satisfactory boats would amount to a tremendous waste of money.

d. Repair and maintenance facilities in the areas envisaged for surf boat operations must be adequate; i.e. experienced boatbuilders and carpenters must be available for possible hull repairs, and experienced mechanics must be on the spot to ensure trouble free service of the engines and possible mechanical fishing aids, such as gurdies and winches.

These notes are offered for the convenience of those in the Indo-Pacific Region, who might want to avail themselves of the services of FAO with regard to introduction of surf going, beach landing, fishing boats. The contents are purely informative and should not be treated as binding promises of an early solution to the problems involved.

DANGER OF BOTTOM-SET COD GILLNETS OF NON-ROTTING SYNTHETIC FIBRES

It has been reported that Icelandic fishermen have recently come across a rather novel problem concerning use of nylon nets. The Icelandic fishermen use bottom-set gillnets for catching cod and each fleet of the gillnets consists of about 15 nets, each net being about 35 fathoms long. Gillnets are totally made up of synthetic materials and are fitted with metal or plastic floats which do not rot and can therefore stay in the fishing position for several years. It often happens that strings of these nets are lost due to breaking of buoy ropes and such nets can continue to entrap fish for a long time. This destroys large quantities of fish. Occasionally, such lost nets have been retrieved after having been in the sea for a number of years and have contained very great quantities of rotten fish, fish bones and recently caught fish. A solution to this problem is to attach the floats to the net by means of untreated cotton twine which would quickly rot away during continuous immersion in the sea. This causes the nets to collapse to the sea bottom and thus cease catching fish. The editor of this Bulletin will be glad to receive any information concerning similar experience with the use of non-rotting synthetic material in fishing gear.

GENERAL TRENDS

Edible Fish Flour to be Produced on Commercial Scale

The first full-scale commercial plant for the production of edible fish flour is being built in Sweden and will come into operation this year. This development, which was reported this week to the Food and Agriculture Organization (FAO), Rome, by representatives of the largest pharmaceutical manufacturing company in Sweden, marks a significant step forward in man's effort to produce a cheap and plentiful supply of animal protein. In the course of developing the flour, the Swedish concern has frequently consulted FAO concerning quality standards, laboratory tests, consumer acceptability, price and other factors. Now that the product is coming into commercial production the company has asked FAO to cooperate in carrying out acceptability tests in some of the underdeveloped countries.

"We have agreed to do this and the tests will be carried out by our Nutrition Division under the supervision of Dr. A.G. Van Veen, Chief of the Food Processing and Preparation Branch," stated Dr. Rudolf Kreuzer, Chief, Fishing Processing Section, Fisheries Division, FAO.

FAO's interest in the production of an edible fish flour was first aroused ten years ago because of the great need for more animal protein in the diet of two-thirds of the world's population of 2,700 million people. Such protein can be supplied through meat, eggs, milk and fish, but there are various obstacles to the production, distribution and marketing of these on a scale large enough to meet

the needs of the undernourished millions. Fish, which is a very rich natural source of animal protein, offered possibilities if, among other problems, means could be found of transporting at low cost such a perishable commodity to distant markets. One suggestion for overcoming the problem was to process the fish to produce an edible flour. FAO and UNICEF have both focussed attention on this possibility and scientists and technicians in many countries have worked on this idea. Acceptability tests with edible fish flour have been carried out by FAO and UNICEF in Latin America, Africa and elsewhere. But the problem so far has been to produce an odourless and tasteless flour which, at the same time, retained its animal protein with a high biological value.

The Swedish pharmaceutical manufacturing concern, which is building the flour factory, has perfected a method for producing such a flour, containing 85% animal protein, which compares with about 15% protein content of fish and meat in fresh state. This is one of the highest concentrated protein substances yet produced by man and may mark a major victory in the battle to supply the mass of people in the world with sufficient animal protein in their diet.

The new flour can be used in making bread, pasta, cakes, pastries, etc., and can be added to soups and sauces and other foodstuffs. Already is Scandinavia plans have been made to produce "pro tein enriched" bread by including up to 5% edible fish flour in the bread. Such an addition adds only a fraction to the cost because the edible fish flour is little more expensive than wheat or maize flour.

In countries where the lack of animal protein in the diet is particularly severe, a much larger proportion of edible fish flour can be added to the bread, pasta, or other foodstuffs.

The flour is produced in a closed–circuit plant, fresh fish being fed into the plant at one end and the flour being delivered at the other end. Any type of fish can be used, from sharks to sprats. The vast quantities of trash fish which are now delivered to the fishmeal plants and are chiefly used to provide meal for chickens which, in turn, provide eggs and meat for mankind, will be equally suitable for the production of fish flour. This provides a more direct and efficient use of the animal protein for human consumption.

The development of this method of manufacturing edible fish flour is of great practical significance for the underdeveloped countries, and the Swedish concern are planning to establish plants in various parts of the world.

Use of Fish Oil in Leather Industry

Researches recently carried out in U.S.A. have shown that the leather industry offers a potential expanded use of fish oils, particularly in fat-liquoring. The process of fat-liquoring consists of treating tanned wet skins or hides with an oil-in-water emulsion, which after the leather is dried, gives the finished product flexibility and serviceability. Although menhaden oil is the fish oil produced in largest quantity, the ease of oxidation and polymerization poses certain problems for fat-liquoring. Two possible ways of reducing the tendency of menhaden oil to oxidize and polymerize are to epoxidize and to sulfate the oil. The studies on epoxidation have not been completed, but the patent literature indicates that epoxized

oil can be used for oiling and waterproofing leather. Sulfation of menhaden oil presents difficulties. The reaction is extremely rapid by regular procedures and is accompanied by excessive oxidation. A procedure developed during the present work and for which a public-service patent is being sought, however, reduces the hazards involved. In laboratory studies, chrome-tanned leather was fat-liquored with mixtures of 60 parts sulfated oil and 40 parts raw oil prepared from menhaden, cod, and neatsfoot oils. Results of the laboratory study indicated, as was expected, that the neats-foot-oil fat-liquored leather produced a softer leather. There was also less decrease in extractable grease on aging than when either cod oil or menhaden oil were used. No important differences were found in the strength properties of the different fat-liquored leathers, and none of the leathers produced spew. No significant differences were found between the cod-oil and menhaden-oil fat-liquored leathers. To check on the favorable results obtained in these laboratory studies, the experiments were repeated on a pilot-plant scale. The results were the same as in the laboratory tests. It is concluded that a satisfactory fat-liquor can be made from menhaden oil.

Effect of Artificial Lights on Fish

The Scottish Home Department has been carrying out experiments and research into the effect of artificial lights on fish and other marine organisms at sea. Artificial lights are used extensively in fishing operation in different parts of the word. Their use is probably greatest in Japan, where important "light" fisheries for a number of species of fish have existed from the earliest times. Lights are also used extensively in the Mediterranean, especially in the sardine fisheries. Hitherto, however, the use of lights in the other European sea fisheries has been on a relatively limited scale. Jenkins (1927) reports that lights were used by Dutch fishermen to attract herring in the 15th century but they are not used by those fishermen today. Norwegian fishermen use them in their purse-seine fishery and they are sometimes used by the Scottish ring-net fishermen to drive herring away from inaccessible places near the shore. Experimental and commercial techniques for catching fish aggregated by lights are described by various workers. While most techniques require the positive attraction of fish to the light, a repellent action in adult herring is used by Scottish ring-net fishermen. Lift nets or blanket nets for catching the aggregated fish are used off Japan and in other regions. The use of fish pump associated with an electrical fishing apparatus for sucking up small herring 7 to 8 cm. (about 3 inches) long aggregated by lights has been described by Smith (1955) and a fish pump is also described by Borisov (1956) and Nikonorov (1957). Since the war a number of experimental studies have been made in the North Sea and adjacent waters on the effect of artificial lights on fish. Experimental work with lights on Atlantic herring did not yield any positive results in the last century (Mitchell 1864). Krefft and Schubert (1950) reported the attraction of young herring to the surface by a 100-watt light. The objectives of work with lights, guided by the above data, carried out from Aberdeen since 1952, have been: (a) to study the behavior of fish in response to lights and other factors; (b) to investigate the possibilities of using lights to attract or repel

fish, particularly herring, as an aid to commercial fishing; (c) as a secondary objective, to assist in interpreting echo-traces. Fifty-nine experiments have been carried out in the period 1953-57 in addition to others before this series was started. Thirty-one of these experiments were conducted off the east coast of Scotland and 28 off the Scottish west coast. The depth of water varied from 2 to 60 fathoms, the most usual depths being between 13 to 33 fathoms.

Experiments on Use of Light to Attract Lobsters

The use of light under water to attract lobsters has been attempted experimentally in East Fife, Scotland. A small battery-powered torch is used with a waterproof-wrapping to keep the battery dry while under water. This light is inserted in the lobster pot which thus becomes an illuminated trap. Initial tests with such illuminated traps have shown good returns; one trap took two lobsters, one of 3½ pounds, and the other of 2 pounds, within a three-hour period. (*Commercial Fisheries Review*, Nov. 1958)

Use of Salt in Electrofishing

Experiments conducted by the U.S. Fish and Wildlife Service have shown that the use of cattle blocks of salt is an effective and economical means of reducing high resistivities and improving electrofishing in large and small, high and low, cold and warm streams. One or two 50-pound salt blocks were usually sufficient in 28 test streams with flows up to 50 cu.ft/sec. to reduce resistivities from a maximum of 207,000 ohms to a range of 25,000 to 50,000 ohms. Increases in the concentration of salt had proportionately smaller effects in reducing the resistivities below 25,000 ohms. A block of salt lasts up to 4 hours in the water. Substantial reductions in resistivities were measured 3.5 miles downstream. The placement of a block in fast or slow, shallow or deep water influenced its rate of dissolution and thereby roughly controlled the degree to which resistivities were reduced. Electrofishing trials were conducted in salted and salt-free sections of high resistivities streams. The following advantages of using salt were determined: the 230-volt, alternate-polarity electrofishing gear performed best within a range of 30,000 to 40,000 ohms; the effective range of the electrode system was greater, particularly in a lateral direction; a greater percentage of available fish was taken on initial passes through test sections; larger numbers of fish were taken per section due to the extended effective range of the electrodes, and the fish were more thoroughly stunned and therefore easier to scoop net. The rate of mortality among trout taken in salted sections was less than 1 percent greater than among fish collected in salt-free sections. Mortalities tended to increase sharply, however, in waters in which resistivities were reduced to 20,000 ohms or lower. On the basis of both mortality and gear performance, the lower limit of desirable resistivity was considered to be 25,000 ohms. Extensive trials have shown that the use of cattle salt in conjunction with alternate-polarity electrofishing gear provides the best means for all-season sampling of fish populations in the extremely high resistivity streams of the southern Appalachian region. The high yield of fish obtained by these means facilitates the computation of more accurate estimates of populations.

Determining the Position of the Trawl Net

Trawling speed and position of net can be given by a new British instrument. The new type log and speed indicator has been designed and manufactured by a British firm primarily for the specialized conditions and demands of trawlers. The instrument differs from the conventional log in that it is streamed from the side of the ship, being boomed out 5 or 8 feet, so that the rotator is in undisturbed water, level with the bridge, where it cannot become fouled in propeller or gear. A small register mounted on the inboard end of the boom, transmits speed and distance reading to instruments located in the wheel-house. The boom is fitted with a topping lift and forward guy. It is claimed that the instrument will indicate when the gear settles on the bottom, when it lifts, when it fouls, etc. The distance repeater registers in tenth of a mile up to 1,000.

Freezing of Sardines aboard for Subsequent Canning

Russian freezerships have fished sardines off the coast of Africa, according to a report of the annual International Refrigeration Institute Meeting in Moscow. The catches were frozen on board the vessel. The frozen sardines were landed in Russia and canned. The results were so good that additional vessels are expected to participate. The Russians also reported that they cooled small herring and anchovies immediately after they were caught. Cooling was accomplished by pumping the small fish in ice-cold ocean water through a 4 in. hose 98 feet long. The process took one minute.

Net Making Machine

A patented automatic power net machine made by a Japanese firm, is designed to make double knot as well as single knot fish netting with both synthetic and natural fibers. It features compact style and sturdy construction, with basic parts covered by detachable metal. One operator can run 2 to 4 machines simultaneously with the aid of automatic stop motion apparatus. Automatic self-adjusting apparatus for warp, and a scale adjusting system are provided. Through the use of a channel wheel instead of gear system, any minute adjustment can be made simply by turning one knob. (*National Fisherman*, Jan. 1959)

NEWS FROM MEMBER GOVERNMENTS

AUSTRALIA

Conservation of Spiny Lobster Stocks

Measures to conserve the stocks of spiny lobsters in Australian waters are being taken by the Commonwealth Government. An increased demand for spiny lobster tails for export has led to a rapid rise in the number of lobster fishermen and depletion of stocks in State territorial waters. As the shellfish move into Commonwealth territorial waters, they are protected by two new conservation measures – a minimum legal length of $4\frac{1}{4}$ inches and a closed season from September 1 to October 15 each year. These regulations aim at giving the spiny lobsters some protection during the period in which

the females are carrying eggs and also aim at ensuring that they are not taken before reaching a size giving a reasonable return in weight of meat. A spiny lobster with a carapace length of $4\frac{1}{4}$ inches would weigh on the average about $1\frac{1}{4}$ pounds. (*Fish. Newsl*, Sept. 1958)

Shrimp Industry

Since 1947, a great change has taken place in Australian commercial shrimp fishing. With the location of shrimp grounds off the coast of New South Wales and Queensland and, to a lesser extent, in Western Australia, the industry has received a considerable boost. Catches have allowed sufficient for home consumption and for export. Of the 30 species known to exist in Australian waters, only six are of importance to the industry. They are the king prawn; Western Australian king prawn; tiger prawn; banana or white prawn; greentail or greasyback prawn; and the school prawn.

Shrimp trawling in Australia is done with otter-trawl gear by day in inshore water, seldom deeper than 30 fathoms. With one exception, where the vessel is rigged with fore and aft gallows, the trawl is shot and hauled over the stern. At the end of each haul the cod-end of shrimp is lifted over the side with the derrick, generally on to the afterdeck, or contents spilled on to a sorting table built to a height convenient for sorting in a standing position. Mud and sand are washed out prior to lifting from the sea. After sorting, the shrimp are carefully washed in tanks supplied with clean running sea water, then put in an insulated fish hold with crushed ice. Sometimes coarse salt is scattered among the shrimp as they are iced down. On many boats the shrimp are cooked after washing and cooled quickly before being placed in the hold.

Trawler crews consist of from 2 to 4 members, depending on vessel size and weight of catch taken, and upon whether the catch is cooked at sea or iced raw. Trawling bottom is usually sand, sand and sponge, sand and shell, mud, or sand and mud, while average trawling speed is around 2 knots. A straight course is not necessarily kept while trawling, the vessels being manoeuvered to avoid known obstacles on seabed, to keep clear of other boats or to turn on a reciprocal course when working a concentration of shrimp.

At day's end most trawling vessels return to port with the catch where it is weighed, cooked (if raw), and packed with crushed ice for consignment to market, or held for further processing before market. At some ports shrimp are left raw for market. Some trawlers, however, remain on grounds for 2 to 3 days before returning to port with the catch. This happens in the Hervey Bay (Queensland) fishery, the locale of some of the biggest shrimp catches at present. Here king and tiger prawns at least 12 inches long or more are being caught in about 25 fathoms. A very satisfactory type of winch is installed in the better-class shrimp trawler. It is chain or belt-driven through a power take-off from the main engine. In the short history of Australia's ocean shrimp fishery a highly efficient overhead type of hauling gear has evolved. Peculiar to Australian vessels, it is best situated just abaft of amidships. Vessels which had been built for Danish seining, for trapping fish or spiny lobsters, or for line fishing were rigged for participation in the newly discovered shrimp fisheries in the early stages. However, with the increase of interest in ocean shrimp trawling, vessels have been specifically built

for this purpose, powerd with a Diesel engine, and equipped with ship-to-ship and ship-to-shore radio. Two are provided with echo-sounders. Australian trawlers range in size from a single-manned 17ft. 6 in. decked boat to trawlers of about 70 feet manned by a crew of four. (*Comm. Fish. Rev.*, Jan. 1959)

CEYLON

The Extension Service Newsletter No. 12 dated 15 March 1959 of the Fisheries Department of the Government of Ceylon gives the following information:

Tilapia and Sea water

After gradual acclimatization of the *Tilapia* in sea water over a period of 8 hours, it has been found possible to make this fish live in sea water indefinitely.

Mechanization of fishing boats

The Ceylonese fishermen display increasing interest in mechanized fishing boats. The Department of Fisheries gives loans up to Rs. 15,000 for the purchase of mechanized boats.

The mechanization of indigenous type boats is also making rapid headway and 20 inboard marine diesel engines and 14 outboard motors were made available for the fishermen on an instalment basis.

Reports have shown that mechanized vessels have always landed a greater amount of fish than the indigenous sailing craft.

Nylon Nets

Nearly 40% of the fishermen on the West coast are now using nylon nets. There were some initial complaints that the nylon nets deteriorated rapidly. The cause was found to be that it was due to drying of the nets in bright sun-light. All fishermen using nylon nets have been told the following directions:

1. Do not dry nylon nets in sunlight under any circumstances.
2. Use head ropes made of kuralon or nylon. Where cotton or coir ropes are now being used, these should be replaced immediately with nylon or kuralon head ropes.

Operation of Marine Engines

As the life of the engine and sterngear are greatly affected by the way in which the engine is fitted to the boat, the following conditions must be observed when the engine is installed:

1. The propellor must be completely submerged when the boat is floating with a light load.
2. The propellor must have at least 1"-1½" clearance from the wood work of the boat.
3. The propellor end of the shaft must not protrude too much from the stern bearing. A general rule is that the length of shaft showing between the stern bearing and propellor hub (thick centre part of the propellor) should be about one half of the diameter.
4. The stern tube should fit snugly into the hole bored through the sternpost, and the outside stern bearing and the inside stuffing box should be firmly fastened to the boat. To make this possible it is often necessary to fit an extra block of wood inside the boat to hold the stuffing box.
5. The shaft must not be inclined

too much, as, for each engine there is a maximum allowable angle of installation which must not be exceeded. The angle varies for different makes of engines, ranging from about 7° to 15°. If the engine is tilted too much the lubricating system will not function properly.

6. The engine must be mounted on strong, long wooden supports or bearers which are firmly fastened to the boat. The engine bolts may pass through the bearers and the hull, or through the bearers only, but in either case the bearers must be firmly fastened to the hull by other bolts or rivets as well.
7. The engine must be aligned to the shaft, that is, the centre lines of the shaft and the engine shaft must coincide exactly. This can be checked by seeing that the faces of the flanges on the shaft and engine are parallel before bolting them together. The aligning is carried out by placing small shims under the engine until the flanges line up perfectly all round. This adjustment should later be checked periodically.

The Administration Report of the Director of Fisheries for 1957 (31 pp.)

Obtainable from Government Publications Bureau, Colombo, Ceylon, contains progress reports for the year 1957 presented by the Department of Fisheries. Among the subjects covered are: Colombo Plan aid; extended technical assistance program of F.A.O.; fishing disputes and regulations; fishermen's cooperative societies; loans to individual fishermen; coastal navigation aids, pearl bank survey; freshwater fisheries; brackish-water fisheries; and biological and technological research. Statistical data are also included on the production of fresh and cured fish, and imports and exports of fishery products and byproducts.

FEDERATION OF MALAYA

During the quarter ending March 1959 the total fish landings in the Federation of Malaya were considerably lower than the first quarter of last year. The total catches were only about 362,330 pikuls as compared with 426,421 pikuls last year.

Mechanization

A total of 219 boats were fitted with engines in the quarter as compared with 199 in the first quarter of 1958. In South Selangor the rate of mechanization has speeded up and 98 boats were fitted with engines. Due to the North East Monsoon there has been a reduction in the rate of mechanization on the East Coast, as is expected, but it also appears that the point has been reached where the vast majority of suitable boats have been mechanized in Trengganu and the figures for 1959 will probably show a steady reduction in the number of new engines fitted until a new level is reached. In Penang outboard engines still hold the market but in Perak the inboard Diesels have become more popular and there has been a marked drop in the number of outboard engines fitted.

Steady progress has been made in mechanization of fishing boats in Malaya.

Year	Powered Boats	Non-Powered Boats	Total
1948	191	19,501	19,692
1954	4,052	17,787	23,429
1958	7,296	17,749	25,045

In early stages of mechanization the vast majority of powered boats were fitted with outboard engines. On grounds of economy and reliability, however, outboards are being replaced by inboard Diesel engines where practicable. The introduction of Diesel engines into fishing boats has resulted in larger, more seaworthy boats being built and the traditional fine lines of the Malay sailing craft are gradually being replaced by the more utilitarian lines of the motor fishing vessel.

There are no Government subsidies for boat building or mechanization. Government funds are available for loans to fishermen for the purposes of building boats and purchasing engines.

Fishermen's Training Course

The first course, with 20 trainees, commenced in February 1959 and finished in April. It is planned to hold four courses this year, and the maximum which can be arranged in one year, so that fullest use is being made of the school and the staff. The Principal-Designate of the School is now in charge of its organization.

The Marine Fisheries School at Penang (part of the Fisheries Department) has continued to hold 3-month courses for fishermen in Engine Repair and Maintenance and in Helmsmanship. Plans are completed for extension to the School and it is hoped that in 1959 a hostel and new classrooms will be completed. A new Fisheries School is proposed to be built at Kuala Trengganu to serve the East Coast fishermen.

Kelantan Fish Marketing Scheme

The Scheme ceased to function as such at the end of 1959 and, following auditing and settlement of accounts, its assets will be transferred to the Department of Cooperative Development.

Freshwater Fisheries

During the period under review a total of 33,595 fry was distributed to various parts of the Federation. Almost half of this total consisted of Lampam jawa fry which far exceeded the number of *Tilapia* supplied.

Lampam jawa have matured and spawned in ponds in the Baling district of Kedah, an achievement which will greatly encourage fish farmers in the area. Mature fish fetched $1.20 per kati in the local market, a price which compares favourably with that for almost any other type of fish. Lee Koh have also been successfully spawned in the Baling area. Similar achievement in other parts of the country will relieve the pressure of demand on the Federal Fry Breeding Station at Tapah.

Tilapia have been reared and marketed at 40-55 cts. per kati in several areas and are being taken from various mining pools which have been cleared and re-stocked by the Department. The stocking of the Trans-Perak irrigation

canals in Kubang Haji, Perit with Sepat has resulted in heavy catches of this fish from the padi fields, landings of more than 50 pikuls per day being reported for the period December 1958 to January 1959.

The programme of clearing and stocking of mining pools has been continued and a further 24 pools of a total area of 63.1 acres have been cleared.

Fishermen's Cooperatives

The East Coast Transport & Marketing Union has further consolidated its position and, with government aid, has acquired an ice plant in Kelantan. This plant will meet much of the demand for ice from fishermen and, as a cooperative venture, will bring about a reduction in the cost of ice to the fishermen.

A first step in the Cooperative marketing and distribution of fish in the North East has been made by the formation of the East Coast Cooperative and Marketing Union which went into operation in February. This Union has undertaken the delivery of fish to various markets in Kelantan from landing centres in Trengganu and, although its initial operations are of necessity experimental, several major problems have already been overcome. If successful, this scheme, and others like it, will stabilise fish prices and give higher returns to the fishermen through their Cooperative Societies.

Offshore Fishing Base

The fishermen's bungalows at Pulau Redang have been fully occupied during the North East Monsoon. Accommodation is still very short and proposals have been put up for the erection of two more bungalows as well as for the construction of a jetty, ice store and fish store which will form the nucleus of a base for fishing operations on a large scale during monsoon periods.

Experiment and Research

Comparative experiments in the use of synthetic netting were carried out in Trengganu by making a gillnet of which part was of nylon net and part of cotton net. The results of initial trials show that the catches in the nylon part of the net were almost double those in the cotton part. The experiment is being continued.

Further experiments have been made in operation of tuna long lines and shark long lines. These have been directed towards determining the most suitable baits and best grounds. Repairs to M.V. KEMBONG have held up the experiments but advantage has been taken of the delay to construct lamp-fishing gear which will be used for catching small fishes and to carry out adaptations to other gears.

In the past year the use of synthetic fibres has become increasingly popular in Malaya, and in certain types of gear in certain areas the traditional cotton or ramie nets have been completely replaced by synthetic nets.

The synthetic materials are used almost exclusively for drift and gill nets and for hand lines and trolling lines.

The main types of fibres used are:

Nylon
Tavilon
Kuralon
Saran

and mixtures of the above.

Most of the netting is of Japanese origin.

Colour preference is stated in certain areas, but there is as yet no conclusive evidence that one colour is any more effective than another. Various shades of brown, pink, blue and white are used. It is said that the brown and pink are best in murky water and blue and white in clear water. In the Malacca area the drift-netters are estimated to have doubled their catches of Spanish mackerel (*Scomberomorus* spp.) and Dorab (*Chirocentrus dorab*) following the change over to synthetic nets in 1958.

Cockle Culture

Routine collection and examination of samples has continued. A physical analysis of soil from various cockle beds is being carried out to determine the properties of the soils. A survey of culture beds at Jelutong, Penang, shows that sewage is discharged on to the beds and further investigations are being made to determine the extent to which the cockles are polluted.

Rastrelliger Research

A programme for routine sampling work on the kembong fishery has been drawn up and stations for collection of specimens have been established. The programme of work will commence in April.

Freshwater Research

An investigation has been made into high mortality among grass crap in ponds in the Chendrong, Lahat and Batu Gajah areas. The symptoms noted correspond to those produced by infection with the bacteria *Cytophaga columnaris*. Samples of the bacteria have been prepared for examination. The simplest means of combating the disease is chemical treatment: introduction of potassium permanganate into the pond water. As this introduces the risk of killing all the fish, the pond owners were not prepared to permit it. Water analyses have been carried out on pond water from various sources. Regular samples from Bayan Lepas are being analysed to determine the relationship between the plankton and chemical contents of the water. Further experiments on the use of piscicides are being carried out to determine dissipation and toxicity.

FRANCE: NEW CALEDONIA

Trochus Shell Industry

New Caledonia's exports of *Trochus* shells, declining steadily since 1954, almost reached the vanishing point in 1957. Exports during 1957 were valued at about US $25,695, compared to US $142,750 the previous year, and US $215,838 in 1955. Overfishing during the immediate post-World War II period is still being felt.

In the face of the depletion of stocks, local officials and specialists from the Institut Francais d'Oceanie have cooperated in a conservation program looking forward to the eventual replenishment of stocks. They have, among other things, recently limited the size of *Trochus* taken to 8 and later 10 centimeters (about 3.1-3.9 inches). Experts hope that by the end of 1958 stocks will be sufficiently replenished to enable the industry

to regain lost ground. The industry is centered among a number of native tribes, and some 2,000 people find employment on a part-time basis. During the first half of 1958, about 125 tons of shell, valued at US $ 31,068, were exported, an indication that *Trochus* exports may increase in the immediate future. (*Comm. Fish. Rev.*, Nov. 1958)

Fisheries Development Program

The South Pacific Commission program for fisheries aims at a better exploitation of marine resources in the South Pacific area, the bringing into production of natural waters by stocking them with various edible fish species, and the promoting of fish culture in ponds where conditions appear suitable.

Active work in the program commenced in July 1954 with the appointment of a Fisheries Officer.

Fisheries planning and implementation take place in close cooperation with territorial administrations and populations.

At its seventeenth session, the Commission approved the creation of a technical committee on fisheries, to advise the Commission on the development of the project.

A three-month Fisheries Training Course, held under the auspices of the Commission and of the Food and Agriculture Organization, ended on February 21, 1957. The Course was attended by 25 trainees from 14 Pacific island territories, and by 4 observers. Fishing operations, fishing gear, fishing craft, and fish culture were the four main subjects covered by the curriculum. Most territorial administrations succeeded in making good use of the trained personnel.

An outstanding result of the stocking of natural waters was observed in Lake Siwi, on Tanna Island in the New Hebrides, where a very small breeding stock of *Tilapia mossambica*, introduced in July 1958, produced in less than 17 months a fish population estimated at well over one million. In spite of an exceptional drought which caused extremely high mortality, the fish are solidly established and the local population has started to catch and consume them.

During visits to territories and through the distribution of technical publications, advice has been given on inland fisheries, transfers of *Trochus* and mother-of-pearl shell, and coastal deep-sea fisheries. (*SPC Annual Report*, 1957)

FRANCE AND UNITED KINGDOM : NEW HEBRIDES

Tuna operations

A tuna fishery has been established out of Santo, New Hebrides conducted by Japanese longliners and crews. A wharf at which to land the fish and buildings to handle the tuna have been built. Seven Japanese tuna longliners are operating out of Santo, according to the latest reports. The longliners are between 80 and 150 tons, carry an average of 20 men and catch 40 tons of fish in about three weeks. They work in fishing grounds up to 600 miles away from base, keeping in touch with each other and the base by radio. The lines are generally set once a day, either at

dawn or sunset, when the fish are believed to be most likely to snap at the bait. The bait consists of Japanese frozen mackerel-pike, and it apparently takes two pounds of bait to produce one tuna of 100 pounds. One ton of bait therefore produces 50 tons of tuna if fishing is good. It takes 4½ hours to set the lines and they are left in the water 2½ hours. It takes 13 hours to haul them in and collect and stow the fish in the ice holds. After that the men sleep for three hours, when it is time to set the lines again. This goes on for three weeks, as a rule, by which time the hold is full and the vessel can return to base.

If the vessel holds 40 tons of fish, the vessel ties up for 24 hours to allow the fish to be unloaded, weighed, and stowed in the freezer; the vessel is then fueled, is iced, and off she goes for another three weeks. If the catch from a big vessel amounts to 90 tons, it gets two days in port, for the catch has to be handled and frozen in two lots. At Santo the wharf has three berths: one for unloading the fish, which travels on conveyor belts to the freezer doors; an inside berth for loading the crushed ice and fuel oil; and an outside berth for overseas ships, bringing oil fuel and frozen bait, and taking away frozen tuna to the United States market, and other factory products to Japan. The Santo fishery establishment was planned in 1953, but was held up for some time by political objections from Australia. At present the base employs 34 Japanese ashore, helped by 35 natives and 5 local Europeans. The 34 Japanese will be slowly replaced by natives, if it proves possible to keep them long enough to train.

The fishing base has been built and put into operation during the last three years by a combination of interests: two Japanese companies, a United States fishery firm, and a local organizer. These four interests are to be joined by a French firm which is being registered in Vila to build a cannery at the base to can the tuna for sale to Pacific Islands and overseas countries, except the United States. Most of the tuna caught is yellowfin, big-eyed, and albacore. Only the latter is sent to the United States and all fish over 100 pounds are cut in half as fillets. A lot of the fish are 200 pounds each.

Besides the tuna there are other large fish caught, such as black marlin, king-fish, and Spanish mackerel. These are shipped to Japan after being frozen or salted. The remainder is consumed by the inhabitants of New Hebrides. All species of fish caught must be accepted by the plant for the fishermen are paid on the basis of the total weight of the catch. The Santo plant consists mainly of a freezer capable of holding about 700 tons of fish. It is built at the wharf, with the fish unloading berth pointing at the main freezer doors. Apart from the main freezers there is an ice-making plant which makes ten tons of ice at a time. Space has been left near the freezer for the canning factory of the French company, which would have a conveyor-belt loading line to the overseas vessel berth. Most of the oil for the vessels and machinery comes in the company's own ship from Japan, but as this is not sufficient, some oil is imported by other ships and an occasional tanker. Over 100 tons of oil a month is used at present, because the company must generate all its own electricity, and this will be increased when the canning factory is in operation. A slipway is being constructed alongside the works to take vessels up to 150 tons. This will provide

for all the fishing vessels and also any local small ships requiring docking.

The actual fishery establishment at Palikulo stands on the site used by the United States forces as an auxiliary port installation, and this greatly facilitated the building of the base. Apart from the main freezer building and engineroon at Palikulo, the company's main enterprise was the building of a special ship to bring supplies from Japan and to deliver the frozen albacore tuna to the United States. This ship is the M.V. SANTO MARU of about 1,000 tons, carrying 600 tons of tuna. She makes the round trip between Japan, Santo, and San Francisco is 55 days. From Japan she brings the frozen mackerel-pike bait, and 150 tons of oil a trip. She takes back to Japan the frozen tuna, the smoked fillets of mixed species, and other byproducts. Her speed is 14 knots. (*Pacific Islands Monthly*, July 1958)

INDIA

The Central Fisheries Technological Research Station (Processing Wing) is now being temporarily located at Ernakulam. Mr. R. Venkataraman, has assumed his post as Assistant Director (Processing). It is an All-India Institution under the administrative control of the Ministry of Food and Agriculture, New Delhi. The Processing Wing will be primarily engaged on applied research which includes fish handling, storing, transporting, freezing, curing and by-products. Its major function will be to cater to the needs and problems of the Indian fishing industry. The Government of India have finalised arrangements to fabricate six refrigerated railroad cars, for transport of chilled and frozen fish and shellfish from production centres to consuming areas. These refrigerated cars which are to be ready within a year will be running between Bombay-Delhi (867 miles), Mangalore - Madras (550 miles) and Waltair - Calcutta (550 miles). The Kerala Government is putting up a 15 ton ice plant with cold storage facilities for 100 tons of fish at Cochin. Both quick freezing and canning industry have expanded. There are at present six canning factories and an equal number of freezing plants functioning in the Kerala Coast. During 1958 quick frozen prawns, lobsters and frog legs worth Rs. 3 million were exported to U.S.A.

KOREA

Packaging of Fishery Products

Korean laws relating to processed fishery products have been reviewed by a United States advisor. He then assisted in the preparation of a series of regulations setting up minimum quality, sanitary, and export licensing requirements for fish-processing establishments and certain frozen fishery products. These are being proposed for promulgation as ministerial orders to improve quality of processed fishery products and to assure first-quality products for export.

Plans were also made for developing a short course to train fish canners in plant sanitation and equipment maintenance. Recommendations were made to broaden the service of the Central Fisheries Experimental Station and the Central Fisheries Inspection Section.

Some 4,500 pounds of frozen shrimp were packed commercially under the United States 8th Army inspection regulations and the first contract was awarded by the Army for the purchase of local fishery products for military and United States civilian consumption in Korea.

Under supervision of a fishery adviser, six cases of frozen and canned fishery products were prepared at the Central Fisheries Experiment Station and shipped to Honolulu as samples for establishing an export business. The shipment consisted of octopus, cuttlefish, scup or porgy fillets, flatfish fillets, dressed horse mackerel, headless shrimp, and peeled and headless shrimp. (*Comm. Fish. Rev.*, Feb. 1959)

PAKISTAN

Development of Fish Industry

The Government of Pakistan is to introduce a programme for the training of fishermen throughout the country as a part of the plan to develop fish industry on sound economic lines. Meanwhile plans for the establishment of a fisheries training centre and of a fish technological laboratory at Dacca have been finalised. In Karachi the Fishermen's Association has stepped up its activities to popularise fish and give more help to fishermen. Arrangements have been finalised to use 20 launches and six trawlers for catching fish on a large scale.

At its 26th Meeting held on 25 February, the Agricultural Development Committee, set up in the Agriculture Division of the Ministry of Food & Agriculture approved the following schemes at an estimated cost of Rs. 5,623 million:–

1–Sea Exploratory Fishing;

2–Development of Mekran Coast Fisheries;

3–Distribution of Fresh Fish in Karachi;

4–Modernisation of Fish Curing Yard at Pasnie;

5–Supply of serum to East Pakistan to combat rinderpest disease in that province;

6–Construction of a hangar for Plant Protection Department's aeroplanes at the Karachi Airport;

7–Kotli Irrigation Scheme.

Pakistan exports processed fish and fish products to the tune of Rs. 2.8 million. With the completion of the Fisheries Development Scheme, mentioned above, fish production is expected to increase considerably and it will be possible to export more fish thus earning more foreign exchange.

Fish Production

Fish production in Pakistan is well on the way towards the target of 30 percent increase during the current Plan period. According to figures available the total production of fish in 1954 amounted to 256,000 tons; in 1957 it went up to 282,800 tons. Production figures for the subsequent years are not available but considering the rate of increase since 1948 when the total production was not more than 77,000 tons, as well as the

recent improvement in fishing facilities one would not be surprised if the target is even exceeded by the end of the Plan period. So immense is the potential fish wealth and so urgent is the need for its exploitation that the current Plan's target is considered very low. As, however, the limiting factors which the Plan had to contend against are in the process of elimination, the Second Five Year Plan is expected to fix a target high enough to ensure at least on ounce of fish per head per day for a population of more than 80 million. Following the U.S. grant in 1957 of 10 million dollars for the development of fisheries, a modern trawler has already been added to the fishing fleet, of which several units have also been mechanized. Arrangements have been made for the procurement of 163 inboard and outboard marine engines for both the Wings. According to the President of the Karachi Fishermen's Association, twenty launches and six trawlers will shortly be available for use along the West Pakistan coast. Large quantities of nylon twine for fishing nets have been supplied to fishermen in the two Wings. Furthermore, under a Rs. 62,000 scheme, cotton yarn, sailing cloth and other requisites are being supplied to fishermen in East Wing where there are also plans to establish a special jetty for landing of fish, wholesale fish market and a fishery biological and technological station. A start is being made on the implementation of a scheme for reclaiming vast derelict water areas in East Pakistan for purposes of pisciculture. There is every prospect of the 10-year scheme for fish-breeding in 140,000 acres of water tracts at the Karnaphuli Dam being taken up for execution on the completion of the Karnaphuli Project. The Karachi Fish Harbour, which was originally scheduled for completion in 1955, will, it is reported, be ready before long. An old scheme for the development of Mekran fisheries has at long last passed into the execution stage. A section of the Central Fisheries Department has been opened at Pasnie to speed up the completion of curing yards and cold storage and ice plants. As in Chittagong and Karachi, the fishermen of Pasnie have been organised into a cooperative society, which has received from CARE Rs. 25,000 for the purchase of modern fishing nets and is expected to get two fishing launches from the West Pakistan Government and under the Mekran scheme, two carrier vessels for the transportation of fish to Karachi. Another limiting factor—paucity of fishermen trained in modern methods of fishing and curing—will soon be removed under a comprehensive training programme which forms part of the Government's ambitious plan to develop the fish industry on sound economic lines. These developments are promising enough to permit a big leap not only towards self-sufficiency in fish and fish products of industrial value but also towards making the fish industry an export industry on a much larger scale than it is now. While, in East Pakistan, fresh water fish is abundant enough for use as a staple diet, in West Pakistan the shortage, particularly in the upper regions, is so acute as to necessitate a staggering drain upon its none too opulent cattle resources. The disparity is forcibly pointed up by the fact, for example, that in 1957 while East Pakistan produced 215,544 tons of fish, West Pakistan could produce only 67,256 tons. There are in this Wing many fresh-water areas which if fully developed as sources of fish production, can easily make the Province self-

sufficient. The most notable area is the Machar Lake the largest fresh-water lake in the sub-continent. This lake alone, it is estimated, can meet the entire fish requirements of West Wing, besides becoming a tourist attraction. But this forty mile long expanse of water is fast silting up and unless preventive measures are taken speedily, there is the danger of this important source of fish-food being lost to Pakistan. The Second Five Year Plan will, it is hoped, treat this lake as a special item in its fishery programme. There are, besides, not a few potential sources of fish production, such as the Kalri Lake, the largest artificial lake in the country, and the 26 mile long Warsak Lake. The new ambitious fishery plan which the Government are reported to have prepared, will, it is hoped, include the development of these and other potential sources as an important step towards making West Pakistan self sufficient in fish food.

Survey of Bay of Bengal and East Pakistan waters

An official of Pakistan's Central Fisheries Department confirmed reports that a Japanese fishing vessel, under charter to the Japanese Government-sponsored Overseas Fishery Cooperative Organization, is scheduled to make a survey of deep-sea fishing in the Bay of Bengal. The 196-ton CHOSUI MARU was due to arrive in Chittagong, East Pakistan, on November 28, 1958, where the Pakistani officials were to board the ship for a trip to Ceylon. Two Japanese fishing experts were scheduled to remain in East Pakistan to survey for shrimp resources with a trawler that accompanied the CHOSUI MARU.

Permission for a joint Pakistani-Japanese exploration of Pakistan fisheries had been sought in the past and been refused. Press reports indicated that with the help of the Japanese fishing experts, the underdeveloped shrimp resources of East Pakistan could lead to increased export trade.

PHILIPPINES

Floating Fish Cannery

A 2,000-gross-ton floating fish cannery was due to be delivered to the Philippine Government under the Japanese reparations program. The M/S ESTANCIA, with a canning capacity of 840 cases of half-pound cans per day, is the second floating fish cannery to be delivered to the Philippines. The first cannery, the M/S MAGSAYSAY, was delivered to the Philippine Government on September 20, 1958.

THAILAND

The Annual Report of the Government of Thailand to the FAO for the years 1955-57 gives the following information.

Fish Culture

In the Northeastern region of Thailand which is generally unsuitable for pond culture because the soil does not hold water well but there are several natural reservoirs. The promotion of fish culture is, therefore, concentrated on the stocking of fish in those natural waters.

For this purpose, six Inland Fisheries Stations:

(1) Nakorn Rajasima Inland Fisheries Station
(2) Khorn Kaen Inland Fisheries Station
(3) Udorn Dhani Inland Fisheries Station
(4) Skol Nakorn Inland Fisheries Station
(5) Maha Sarakarm Inland Fisheries Station
(6) Ubol Rajadhani Inland Fisheries Station

have been established. The Northern region consists of high mountains covered with forests. Fish culture in rice fields is being extended. There are two Fisheries Stations in this region:

(1) Chiengmai Inland Fisheries Station
(2) Chiengrai Inland Fisheries Station

The Central Region of Thailand consists of vast plain area and the soil is suited for pond construction. There are two fisheries stations in this area:

(1) The Bangkhen Fisheries Station
(2) Nakorn Swan Inland Fisheries Station

In the south, the mangrove swamps are being adapted for culture of brackish water fish.

There are two Fisheries Stations:

(1) Prachuabkirikhan Brackish Water Station
(2) Padalung Brackish Water Fisheries Station

The following kinds of fish seeds were distributed from the Inland Fisheries Stations for fish culture: *Tilapia* which formed more than 60% of the total, common carp, *Trichogaster pectoralis*, Giant gouramy, *Pangasius* sp., *Clarias batrachus*, *Lates calcarifer*, Chinese carps, *Helostoma temmincki*, *Chanos chanos* and *Puntius gonionotus*. At the Bangkhen Experimental Station, the successful hatching of the burry prawn (*Macrobrachium carcinus*) was done.

Fisheries Technology

As a consequence of the decision in 1956 to establish a Fisheries Technology Section in the Department of Fisheries in 1956, the plans and programme were carried out with the assistance of an FAO Expert. The Section has the following staff: one technologist, 3 chemists and one biologist.

Mechanization of Boats

The Fisheries Revolving Fund of 700,000 Bahts has been made use of to help the marine fishermen to hire-purchase Diesel engines for installation in fishing boats. Up to the end of February 1958, the hire-purchase of 109 engines has been made.

Fresh Fish Trade

The Technology Section of the Fisheries Department had found that the following factors are responsible for the loss of good quality of Pla-thu: insufficient amounts of ice and improper mixing and storage of the fish in the ice. Installation of mechanical ice-crushers on board the fishing and fish carrier boats have been recommended. In order to ensure a steady supply of fresh sea fish in inland population centers, two types of insulated containers have been developed by the Technology Section.

Salted Fish

There are 20,000 tons of salted fish exported from Thailand for a year. In many places the fishing season coincides with the rainy season and natural drying is not possible. Preliminary experiments by the Technology Section have indicated that artificial drying offers possibilities.

To prevent the export of inferior quality salted fish, rules and regulations concerning inspection and certification of salted Pla-thu were issued by the Minister of Agriculture in 1955. This practice of inspection prior to export has ensured that the importing countries receive products of satisfactory quality. The total volume of exported salted Pla-thu was 34,111.22 tons up to the end of 1958.

New Fisheries Products

The experiments carried out by Technology Section indicated the possibility of production of good quality tuna in oil pack. New products such as artificial smoked bonito, fish sausages, fish balls and fermented fish are being developed. Fish sauce and fish paste from various raw materials have been investigated.

Fish Meal

Practically no surplus of fish is available to justify any large scale production of fish meal. But, occasionally surplus fish are landed which require preservation. A method to preserve such surplus using sodium nitrite has been developed by the Technology Section.

In certain parts of Thailand there is a great need to supplement the food of the people with the cheap protein. Preliminary tests with fish meal for the human consumption indicate that the product may be accepted but it is too early to say whether this is going to be a commercial proposition.

UNITED KINGDOM

FIJI ISLANDS

Development of Fishing Industry Proposed

Proposals for a fishing industry in the Fiji Islands are made in a report of a committee set up in 1957 by the Fiji Government following a survey carried out by a South Pacific Commission fisheries officer.

The report recommends that a fisheries officer be appointed to advise on and supervise the development of sea and inland fisheries.

Other suggestions include encouragement of long-line tuna fishing, the establishment of a fish cannery, and the provision, with Government assistance, of refrigeration facilities for bulk storage of fish. (*Pacific Islands Monthly*, Oct. 1958)

HONG KONG

The Quarterly Progress Report for October / December 1958 of the Department of Agriculture, Fisheries & Forestry, Hong Kong gives the following information.

Fish Landings and Prices

Compared with the corresponding quarter for 1957, there is a decrease of 16.7% in fresh fish landing and a decrease of 6.6% in salted dried fish. Overall average

wholesale price for fresh fish, including prawns, was 17.5% higher, the actual price being $74 per picul as compared with $63 in 1957. The decrease in fish landings was attributed to the poor catches of yellow croaker and anchovies and the restrictions imposed by the Chinese Mainland authorities.

Mechanization of Fishing Craft

A total of 20 mechanized fishing boats (8 of which are newly-built craft) were licensed by the Marine Department. These boats consist of small longliners, shrimp trawlers and purse-seiners. The total number of fishing vessels in Hong Kong is at present 2,358.

Fishing Gear

Experiments using otter boards on the two wings of native type trawl nets were carried out with good results. A pair of otter boards 6 ft. 6 in. × 3 ft. 8 in. × 2 in. was loaned to a fisherman for trial with his trawl net in the off-shore fishing grounds. A report on the result of this trial will be submitted by the fisherman concerned in the near future. 28 fishermen who operate shrimp trawls received instructions from Fisheries Supervisors of the Department on how to make shrimp trawls from sheet netting by machine. This method has saved them a great deal of time compared with the old method of making a net by knitting mesh by mesh.

Training of Fishermen

40 fishermen were trained by the Department during the quarter and were given certificates of competency as coxswains.

Fishing Operations

The 2 vessels of the Division carried out 10 trial trips on shrimp beam trawling, 8 trips of pair trawling and 4 trips of otter trawling. The catches in every case were poor because the area of operation were grossly overfished.

Deep sea longliners and deep sea trawlers whether sailing or mechanized remained within territorial waters because of the restrictions from the Chinese Mainland Authorities and this had lead to overfishing of territorial waters resulting in low catches. The season for anchovies was disappointing but round herrings and pilchards were obtained in large amounts.

Fish Culture

1,800 piculs of fish were harvested from ponds during the quarter. There has been a steady increase in the price of pond fish.

Fish Fry Trade

No restrictions were imposed by the Chinese Mainland Government on the export of fish fry from China. The licensed exporters delivered 3,218,750 fry to Hong Kong. The fry was made up of the following species: 308,750 bighead, 1,550,000 silver carp and 1,360,000 grass carp. Prices charged were slightly higher than those charged during the previous quarter. Mortality of all consignments amounted to about 15.7%. Of the 3,281,750 fry received from China 2,663,600 were re-exported in 36 shipments, some by air and others by sea to Thailand, Singapore, Bangkok and Phnom Penh. Approximately 50,000 of the fry which were imported were sold to local fish pond owners for stocking their ponds in the new Territories.

SINGAPORE

Central Fish Market Planned for Singapore

Leading merchants and auctioneers plan to invest a million dollars in a central fish market in order to organize the marketing of marine products in Singapore. In the past the market has been scattered and irregular and the marketing of fish has been unsatisfactory.

The new scheme envisages the establishment of an auction center, a wholesale market equipped with new modern handling facilities, and an ice factory, as well as facilities for landing fishing craft. It is hoped that the new market will result in better quality fish being marketed at lower prices. Fish is an important source of protein for the people of Singapore.

Fisheries in 1957

The total catch of fishery products in Singapore during the year 1957 was estimated at about 13,593 metric tons.

Very little of the domestic catch is processed. During the early part of the northeast monsoon, part of the anchovies caught is boiled in brine and sold as " boiled fish ". The total volume of fish consumed in Singapore in 1957 was estimated as about 37,000 tons.

The number of fishing vessels licensed in 1957 were: 2,122 non-powered vessels; 488 vessels powered by outboard motors; and 156 vessels powered by outboard motors; and 156 vessels powered by inboard engines. A total of 1,924 licenses were issued in 1957 to fishing gear operators. (*Comm. Fish. Rev.*, Nov. 1958)

Plans for Tuna Cannery and Freezing Plant near Completion

Plans for the tuna cannery and freezing plant to be built jointly with Singapore and Japanese capital are now near realization. A Japanese fisheries mission was in Singapore in November 1958 studying the plans and conferring with Government officials. The manager of the Singapore Industrial Promotion Board in a public statement said that an agreement on establishing a tuna fishing industry in Singapore is expected by the end of 1958.

Plans call for the investment of M$ 5,000,000 (US $1,633,000) with the Japanese providing 51 percent and local sources the remainder. It is expected that 250 people will be initially employed at the plant. (*Comm. Fish. Rev.*, Jan. 1959)

UNITED STATES OF AMERICA

HAWAII

The U.S. Fish and Wildlife Service Fishery research vessel, the CHARLES H. GILBERT, returned to Honolulu on Thursday, March 26, from a 79-day cruise to the South Pacific. The vessels return marked the completion of a 2½ year oceanographic and fishery research program conducted by the Hawaii Area

Laboratory in the waters of the Marquesas and Tuamotu Islands. A west coast tuna clipper, the CAPE FALCON, captained by Sverre Jangaard from San Diego, participated in this most recent survey to determine if the tuna were sufficiently abundant for live-bait fishing on a commercial scale.

The GILBERT was primarily engaged in determining the abundance of surface schools of skipjack and yellowfin along survey tracks which had been followed during previous cruises. Mr. Robert Wilson, Field Party Chief, reported that the number of schools sighted was less than half of those reported during the same seasons in 1957 and 1958; also, that the fish were small, averaging about 6 pounds, and the schools, although large, were frequently wild and difficult to chum to the vessel.

Mr. Tom Hida, a fishery biologist from the Hawaii Laboratory, accompanied the CAPE FALCON from San Diego to Almejas Bay, Mexico, where 24,000 pounds of live bait were loaded prior to proceeding to the Marquesas. He reports that a total of nearly 200 schools, mostly skipjack and yellowfin, was sighted in the waters of French Oceania. The vessel caught only 16 tons in the season proven to be best during previous years. This disappointingly low figure resulted from the comparative scarcity of schools, the small size of the fish and their wildness, and the fact that the Mexican bait was too large.

Mr. William Tanaka, Captain of the Gilbert, reported that approximately 1,000 live Marquesan sardines were released in Maunalua Bay, Oahu. This is the eighth Oahu release of these fish which were introduced as a possible supplement to the nehu, which is in short supply and is the principal live bait used by the Hawaiian aku fleet. Since the first release made in December 1955, recoveries have been made, usually by commercial fishermen during baiting operations, from waters near the islands of Kauai, Maui, Hawaii and Oahu. Those sardines caught near Kauai, Oahu, and Hawaii are believed to be the result of spawning in the Hawaiian area, indicating that these fish, transported from French Oceania, have taken up housekeeping in local waters.

FAO ACTIVITIES

Staff Movements

Dr. D.B. Finn, Director of the Fisheries Division visited during February 1959, the following countries of the Indo-Pacific region: India, Burma and Thailand. In India, he inaugurated the FAO/IPFC Fisheries Statistics Training Centre at Bombay. In Delhi, a review of the fisheries development programme with the Government Officials was made. In Thailand, he inspected the fisheries laboratory and discussed the fisheries development as well as FAO Technical Assistance Programmes with the Government Officials.

Dr. Eirik Heen of Norway has taken over as Chief, Technology Branch, Fisheries Division. He arrived in Rome on 5 March 1959. Before he joined FAO, Dr. Heen was Director of the Norwegian Fisheries Research Institute at Bergen. He was closely associated with

FAO's programme of work over several years. He was the Vice-Chairman of the Technical Committee on Fisheries at the 8th FAO Conference in 1955 and was Chairman of the same Committee at the 9th Conference.

Dr. G.L. Kesteven, Chief, Fisheries Biology Branch visited during April, Bombay, Cochin and Delhi regarding matters concerned with the India Education Committee, of which he is a member. This Committee was formed to review and assess the training requirements for fisheries personnel to man the administrative and executive positions in the fisheries development and research projects in India. The Committee also recommended the location, courses of study, staff and other details.

Mr. S.J. Holt was in India during March, to lecture at the IPFC Fisheries Statistics Training Centre at Bombay.

Prof. W.C. Beckman (USA) has taken up the position of Inland Fisheries Biologist at the end of April.

FAO Loans Fish Farming Expert to U.S.A. Upon request of the U.S. Department of the Interior's Fish and Wildlife Service, the Food and Agriculture Organization of the United Nations has assigned Dr. Shao-wen Ling, one of the world's leading pond-fish culturists, to the U.S. Bureau of Sport Fisheries and Wildlife for a three-month period.

Dr. Ling, who has his Doctor's degree in limnology from Cornell University, is a native of China. He will act as consultant for the Bureau of Sport Fisheries and Wildlife on the establishment of a research laboratory and experimental station which is to be built in Arkansas to study fish propagation problems in rice-growing areas.

His main task will be to visit possible experimental sites, recommend pond layouts and develop plans for research in the fields of warm-water fish diseases and parasites, genetics, selective breeding, nutrition and other physiological requirements, and to make recommendations on fish-crop rotations.

Before beginning his assignment in the rice-growing area, Dr. Ling will survey research stations and warm-water fish hatcheries in the South and will consult with one of America's leading fish culturists, Dr. H.S. Swingle of Alabama Polytechnic Institute at Auburn.

In spite of the widespread practice of fish culture in foreign countries, the idea never took hold in the United States until in recent years when the rice farmers of Arkansas became interested in fish farming almost by accident. In bringing new rice acreage into production it was customary to build levees around a tract of land, filling the resulting reservoir with water and letting it stand for a couple of years until the timber died and the decaying vegetation enriched the soil.

Following the procedure, farmers soon found that the water in the reservoirs always contained abundant supplies of the local species of fish. Presently the question arose as to whether better breeds of fish might be raised to bring a greater yield and a more lucrative cash crop to the farmer.

To find the answer to this question, the Congress has authorized the Fish and Wildlife Service of the Department of the Interior to establish a laboratory and experimental station.

Dr. Ling has just completed an assignment in Ceylon assisting the government of that country in the development of its inland fisheries.

When he completes his task in America he will go to Malaya to help that newly created independent nation with its fishery problems.

After receiving his Doctorate from Cornell in 1933, Dr. Ling returned to China as Assistant Professor of Biology at the University of Amoy. In 1935, he moved on to the University of Shantung in Tsingtao as Head of the Department of Biology. While there he organized a fishery research laboratory.

The Japanese invasion in July 1937 led to his evacuation and the following year he was one of the founders of the National Medical College at Kweiyang, where he served as Head of the Department of Biomorphics (Developmental Biology). In 1939, the Hong Kong Government invited him to join its Fishery Research Institute as Fishery Biologist. He also served concurrently as guest lecturer at the University of Hong Kong.

When Hong Kong was occupied by the Japanese, Dr. Ling returned to Kweiyang and joined the Medical Training Center of the Ministry of National Defense. He also was Director of the Kweiyang Provincial Science Institute.

With the coming of VJ Day, he was asked by the Ministry of Agriculture to organize a National Fishery Research Institute in Shanghai, and served as its First Director.

Dr. Ling joined the staff of the Food and Agriculture Organization in the spring of 1949 and was assigned to the FAO Far Eastern Regional Office in Bangkok.

While in Thailand, he was instrumental in interesting His Majesty King Phumiphol Aduldej in fish farming; so much so that the latter converted an abandoned swimming pool on his palace grounds for the purpose of raising *Tilapia* which were then distributed to the Thai farmers. The interest shown by His Majesty gave a great impetus to fish farming in Thailand and resulted in the creation of a new industry in that country.

TECHNICAL ASSISTANCE

Professor John Stiles Dendy (U.S.A.) has been appointed as T.A. Fishery Officer, Limnologist to the Philippine Government.

His duties will be as follows:

"To advise and assist the Philippine Government in conducting limnological and fishery investigations of inland waters with a view to promoting fish culture."

Professor Dendy is the Professor of Zoology at Alabama Polytechnic Institute, Auburn, Alabama, and has done research in limnology, food of fish, distribution, teaching and directing research workers in the above subjects, and fisheries biology.

He is the author of several publications on fish distribution, food of several species of fish and largemouth bass and depth distribution of fish in relation to environmental factors.

FELLOWSHIPS

FAO Fellowship for Korean Fisheries Officers: FAO Fellowships have been awarded to eight Korean fisheries officers. Mr. Ji Hwan Chang will be spending about 12 months in Canada, the United States, Hawaii and Japan. Subject of the study will be fisheries oceanography.

The details of study programme are as follows:

1. Study of modern instruments and gear (both shipboard and laboratory) used in exploratory fishing and oceanographic surveys; their handling and interpretation of results. Purposes of different measurements and sampling; treatment of samples on shipboard. Laboratory methods of analyses of survey materials. Organization of surveys and exploratory fishing. Cooperation between different disciplines and scientists on these cruises. Participation on survey cruises. Biological survey collections (plankton and benthos); their treatment and analyses. Significance of these data for various predictions in fisheries.
   (a) Four months study in Fisheries Research Board of Canada in Biological Station and Pacific Oceanographic Group, Nanaimo, B.C. Canada.
   (b) Three months study with North Pacific Exploratory Fishing, Seattle, Washington with participation on cruises to Bering Sea and Washington Coast.
   (c) One month with POFI (Hawaii), participating on their oceanographic and exploratory tuna fishing cruises.
   (d) One month visit to Scripps Institution of Oceanography and Inter-American Tropical Tuna Commission (learn the most modern equipment and methods etc.).
2. Study of the existing literature on the subjects and on North Pacific in general. Familiarize with the existing foreign periodicals and publications in fisheries and oceanography. Exercise on interpretation of various survey data in respect of fisheries needs. One month and a half in Fisheries – Oceanography Library; School of Fisheries, Department of Oceanography and Friday Harbor Laboratories; University of Washington, Seattle.
3. Use of maritime meteorological data for fisheries. Forecasting of oceanographic conditions for predicting the best fishing grounds for pelagic fishery. One month and a half with Maritime Division, Japanese Meteorological agency, Tokyo.

Mr. Bu Kwan Chung will study techniques of survey of fishery resources and fishing grounds and will be placed with the Biological Station of the Fisheries Research Board of Canada at Nanaimo. He will also visit the Pacific Oceanic Fisheries Investigations at Hawaii. His period of study will be 12 months.

Mr. Hee Un Chang of Korea has also been awarded an FAO Fellowship to study fish canning techniques abroad.

Mr. Jai Dong Ro, Fisheries Technican of the Bureau of Fisheries, Korea has been awarded a six months' fellowship training in the United Kingdom and

Germany in the field of Fish Cold Storage and Refrigeration. The fellowship is to start in early June 1959.

Mr. Jong Joon Park, Korea has been awarded a 6 months FAO/ETAP Fellowship. The subject of study is fishery equipment and methods. He will visit Italy where he will study light fishing and purse seine. In Iceland he will work on the Icelandic trawlers and also study purse seine, driftnets for herring and bottom-set nylon gillnets. In Germany he will acquaint himself with practical gear research that is being carried out there. In Canada he will study the herring mid-water trawl and its developments.

Mr. Bang Byung Sung of the Central Fisheries Experimental Station, Pusan, has been granted a 6 months' fellowship to study the selection, operation and maintenance of echo-sounding and echo-ranging equipment. The study will be undertaken in U.K., Germany, Norway, U.S.A., Canada and Japan.

Mr. Young Tek Hong of the Nam Yang Su San Co. Ltd. Korea has been awarded FAO fellowship for 6 months to study fisheries management. He will visit Italy, Denmark, Netherlands, U.K. and West Germany.

Mr. Jong Do Lee of the Bureau of Fisheries, Office of Marine Affairs, Seoul, Korea has been awarded a 6 months' fellowship in Canada to study fisheries administration and cooperatives.

Indian Fellow to study Deep Sea Fishing: Dr. P.I. Chacko, Assistant Director of Fisheries, Madras, India has been awarded five-months' fellowship for study of deep sea fishing. He is due to leave for Japan in the middle of May this year.

Malayan TA Fellow to Study Fish Marketing: Tengku Bin Abdul Kadir Ubaidillah, Distribution and Marketing Officer of the Department of Fisheries, Federation of Malaya, has been granted a TA fellowship to study Fish Marketing in U.S.A. and Hong Kong.

Mr. Tengku commenced his fellowship in January 1959 and is attending the marketing course at the Louisiana State University. After completing this course and spending 7–8 months in U.S.A., Mr. Tengku will extend his study to include a review of the fish marketing organization and practices in Hong Kong.

He is a graduate of the University of Malaya with a B.A. (hons.) in Economics and has been employed by the Department of Fisheries, Federation of of Malaya, since October 1957, during which period he has been studying the fresh fish marketing system in the Federation, and various developments so far being achieved as well as problems connected with handling, distribution and marketing of fish.

The particular objective of the present fellowship is to allow Mr. Tengku to study the principles and problems of marketing with special attention to fish and rice marketing.

Atomic Energy and Fisheries

Atomic energy, particularly through the use of radioisotopes and radiation in research, will play an increasingly important part in the development of the world fishery resources, according to a report on "*The Potential Contribution of Atomic Energy to Development in Agriculture and Related Industries*," published by FAO. The report covers power applications, the use of radiation in food preservation and processing and in plant breeding, the value of radioisotopes in research, and the significance of research to the development of

agriculture and related industries which, of course, include fisheries.

Referring to radioisotopes, the report says that use of them can "accelerate and enhance the contributions of research to the development of world fisheries". While about three-quarters of the world's surface is occupied by water, it provides less than 2 percent of the world's food supplies, but this 2 percent represents about 10 percent of the animal protein consumed.

"Every effort should therefore be made to increase world fish production," the report declares. "This can be achieved by extension and intensification of current fishing operations, by improved management of those operations and by effecting advantageous changes in the fisheries resources themselves".

Such a program calls for the comprehensive investigation of the resources and in such research radioisotopes can be of particular help "in measuring the basic production of water areas, in following the passage of nutrient material through the successive links of the food chains of fish of economic value to man, and in various other parts of the program".

The success of such research "will permit a better planning of fishing operations" and more efficient use of resources.

The report also points out that the application of nuclear derived power could be of considerable significance to the fishing industry, particularly "for use in mother and factory vessels of fishing and whaling fleets operating over long periods at great distances from their bases, especially in the Antartic".

It points out that present power plants in fishing boats, including fuel tanks, occupy about 40 percent of the available space on board. The introduction of small nuclear propulsion plants could radically change the situation. "The size of the vessel could be decreased, or its speed increased, or the fish-hold space or fish-processing space increased for the same sized hull".

While the report deals largely with agriculture, it is of considerable interest to all engaged in fisheries.

The Second World Fishing Boat Congress

More than 300 participants from upwards of 40 countries took part in the FAO Second World Fishing Boat Congress and discussed more than 50 technical papers concerning the design, construction and performance of fishing vessels. At the opening Session, the Director-General of FAO stated that the first Congress held in 1953 was an outstanding success in pooling knowledge and exchanging experiences and ideas concerning fishing boat design and construction in all parts of the world. Since the first Congress was held many new developments have taken place in connection with fishing vessels. Chilled sea-water for preserving the catch is being introduced on the Pacific Coast of the Americas. Large powered blocks are being introduced to handle encircling nets. More fishing vessels are being built with transom sterns, and even bulbous bows are now used on large trawlers. Stern trawling is being adopted on large factory trawlers, and there have been many advances in the design of diesel and gas turbine machinery, as well as in the design of propellers.

More and more naval architects are employed in the design and construction of fishing craft. Government activity of some years ago which was mainly in the hands of biologists now includes employment of naval architects for fishing boat development. Recent investigations have shown that fishing boat constitutes about 67% of the total investment in the fishing industry. Concluding, the Director-General wished the Congress much success.

Dr. Finn, Director, Fisheries Division, stated that the Second World Fishing Boat Congress is a carefully planned part of a larger plan of attack on one of the most crucial problems that face the world, and that is the task of increasing food production, particularly animal protein foods for the increasing world population. Many ideas which at present might seem fanciful become possible in the next few years such as use of submarines and atomic energy for fishing.

IPFC AFFAIRS

Malaya Becomes a Member of the Indo-Pacific Fisheries Council: The Federation of Malaya on 3rd September 1958 informed the FAO that it had accepted the Agreement for the Establishment of the Indo-Pacific Fisheries Council. In accordance with the provision of Article IX of the Agreement, Malaya became a party with the Agreement on 15 September 1958, the date of receipt of the instrument of acceptance.

Mr. J.A. Tubb, Secretary of the IPFC paid visits to Malaya, Singapore, Sarawak, Brunei, North Borneo, Philippines, Hong Kong, Vietnam and Cambodia during April and May 1959. Of particular interest during discussions with fisheries authorities in these countries, were the recent developments in fish culture, particularly extension work as well as the growing interest in mechanization. Mr. Tubb also discussed at some length with the several Governments concerned the current Indian Proposal to establish a high level Fisheries Administration Training College. The Governments generally were not prepared to commit themselves concerning their support of such a college pending further information regarding curriculum and cost. However, considerable interest was expressed in the proposal and many Governments would seem to be willing to avail themselves of training facilities at such a college for a limited number of students. During the tour, forecast programs for Technical Assistance were discussed and advice was given on technical fisheries matters.

Dr. G.N. Subba Rao, Fisheries Officer, arrived in Bangkok on 16 March 1959 to take over as Technical Secretary of the Panels A & B of the IPFC Technical Committee II. During May 1959, he visited Indonesia to review recent developments in paddy cum fish culture, fish handling and processing methods, mechanization of fishing craft, use of synthetic materials for fishing gear and visited a number of inland fisheries training establishments. He discussed with government officials the Indian proposal to establish the Fisheries Administration Training College and the 1960 Technical Assistance Program. He also visited the Kota Baru Fishery Community Project and reviewed with the officials concerned the progress made so far on the project.

PERSONALIA

Mr. G.M. Charidjie Kasuma was transferred on 1st January 1959 from his post as Deputy Chief of the Sea Fisheries Service, Indonesia, for a period of 5 years to be Managing-Director of the newly established Farmer's and Fishermen's Bank. This new Bank recently established by the Government of the Republic of Indonesia is designed to aid in the development of the agricultural and fisheries industry of Indonesia by providing finance for approved projects and assisting in the provision of material requisites for the orderly and efficient development of fisheries industry. Mr. Kasuma has been intimately associated with the IPFC for many years and his work in connection with the Sea Fisheries Service of Indonesia is well and widely known throughout the region.

Mr. Garth I. Murphy, the Area Director of the U.S. Fish and Wildlife Service, Hawaii Area, resigned his post and took up new duties with the California Cooperative Fisheries Investigation at La Jolla, California. He is succeeded by Mr. Vernon E. Brock.

CURRENT READING

W.E. Ricker. Handbook of Computations for Biological Statistics of Fish Populations. Bulletin No. 119. Fisheries Research Board of Canada, Ottawa, Ont., Canada, 1958. 300 pp. Price $5.00.

This Bulletin has been prepared to meet a need for a summary of computations used in estimating statistics of population size and exploitation, particularly those applicable to fishes. Basic procedures and their important variants together with worked examples are included. The following are the different chapter headings:

Chapter 1. Introduction

Chapter 2. Estimation of survival rate from age composition

Chapter 3. Vital statistics from marking: single season experiments

Chapter 4. Population and survival from marking experiments extending through two or more time intervals. Rate of survival constant.

Chapter 5. Population and survival from marking experiments extending through two or more time intervals. Rate of survival variable.

Chapter 6. Estimation of survival and rate of fishing from the relation of fishing success to catch or effort.

Chapter 7. Estimation of survival and rate of fishing from catch and effective fishing effort in successive years.

Chapter 8. Estimation of stock and mortality from statistics of the catch and its qualitative composition.

Chapter 9. Growth in length and in weight.

Chapter 10. Computation of yield from a given recruitment.

Chapter 11. Relation of recruitment to the size of the adult stock.

Chapter 12. Direct estimation of the relation of equilibrium yield to size of stock and rate of fishing.

There is a bibliography of some 260 references.

Yearbook of International Organizations

Advice has been received that the 7th edition of the Yearbook of International Organizations has recently been issued. All entries have been revised and 175 new entries incorporated since the 1956 issue. Published by the Union of International Associations, which was founded in Brussels in 1910, the Yearbook has now become the standard guide to international structure, and has in fact been officially endorsed and recommended by the United Nations.

Innovation in the 1958/59 edition of the Yearbook include a list of organizations described therein for which the previous edition did not contain entries, as well as conversion tables of entry numbers, enabling quick comparison to be made of changes which occurred between 1956 and 1958 in any particular organization. A special section provides a handy guide to the European Communities and their organs.

A tightly printed 72-column subject index reveals that in 1958 there is practically no field in which there is not regular and organized traffic across frontiers, involving exchange of ideas and contracts between individuals of different nationalities. (One of the organizations listed has members in 254 countries or territories).

The number of people associated with international work is increasing steadily. The new Yearbook gives the names of 8,415 officers of international organizations (of whom, by the way, barely one-tenth are women), and the total paid staff of some 500 organizations is 12,854 (excluding the many thousands employed by the United Nations).

The financial strength of international organizations is becoming impressive. The budgets of 477 international non-governmental organizations total US $290,463,172, while 73 inter-governmental bodies handle between them $330,033,150.

The Yearbook of International Organizations, 7th (1958-59) edition, Union of International Associations, Palais d'Edmont Brussels I, October 1958; cloth bound, pp. 1,264, is priced at US $14.

Enquiries concerning the Yearbook should be directed to Mr. G.P. Speeckaert, Secretary-General, U.I.A., Palais d'Edmont, Bruxelles I (Belgique).

Lionel A. Walford. Living Resources of the Sea. xv + 321 pp., illus. The Ronald Press Company, New York, 1958. US $6.

The subtitle, "Opportunities for Research and Expansion", is a fair characterization of this unusual book by the former chief of fishery biological research of the U.S. Fish and Wildlife Service. The author concludes, quite realistically, that the opportunities for research are far greater than the opportunities for an immediate, or even an early, expansion of the harvest from the sea.

The book is addressed, the author says, "to everyone who is interested in

the rich possibilities of the marine wilderness," but he hopes it will be helpful and stimulating to fishery scientists and students and to members of the fishery industry.

The book is unusual in asking more questions than it answers. Perhaps space considerations, perhaps the many books on the subject which have appeared since Carson's-Sea-Around-Us become a best seller, moved the author to avoid repetition of the mass of natural history on fish and marine life—at any rate, many of the chapters are relatively barren of factual information. Yet, the author's evident aim is realized. He conveys the impression of vast areas of the world ocean which are still virtually unknown except in superficial or scattered aspects, of still other vital areas where knowledge is too incomplete to have much practical, i.e., economic, significance.

Each chapter is introduced by a short foreword which serves not only as a condensed summary but also as a welcome introduction to the following subject matter. This orients the reader and makes reading and understanding easy and pleasant.

Part I, the Marine Wilderness, includes seven chapters which discuss the applications of the various sciences to fishery science. They constitute a rather straightforward review of the general field, pointing out the need for filling the many gaps in knowledge of these subjects. The chapter on the geography of fisheries and worldwide distribution of our fishery knowledge would have been vastly improved had the author employed a more familiar form of world map.

Chapters 8 to 12 constitute an uneven treatment of mostly unrelated but much-discussed subjects: The Dream of Harvesting Plankton, Farming the Brackish Waters, The Role of Disease, Poison (i.e., poisonous fishes and plankton), and improvement of Fishing Vessels and Gear. In these chapters the author again points out our ignorance rather than what is known. The last of these chapters, on fishing vessels and gear, contains a fuller account of what is known than the others do.

Part II is a condensed account of the principal *Resources of the Sea*, presented in five chapters. Considering the restricted space allotted to this area of knowledge, the facts, ideas, and conclusions are well balanced, reliable, and satisfying.

The final chapter, Looking Forward, is original, at many points inspiring, and always satisfying in summing up as well as in pointing out. The last paragraph is worth quoting:

"but why put up with such antiguity? Why should not technologies and philosophies advance? If we learned how to use the sea resources fully and scientifically, the material rewards should well compensate for all the investment that would be required for the learning. There is no way of evaluating these rewards now. Nor can anyone honestly promise that they will in fact be forthcoming, any more than anyone could once have promised the ultimate use of atomic energy. There is no simple, direct short-cut to a full understanding of the proper uses of the sea. The most economical, efficient way to reach that understanding is not to try to do it penuriously. If we really desire to exploit the sea fully, if it is knowledge that we need to accomplish that purpose—and that is the theme of this book – then we had better make the necessary costly

investment and put full effort into the job of acquiring that knowledge".

The style is clear and direct; the diction is rich and sure. The text is remarkably free from rhetorical or typographic errors and is free from distracting footnotes—which is unusual in a review of great masses of source material. All references are collected, by chapters, at the end of the book, where there is also an index.

The book will be invaluable to the graduate student (and his professor) and to the professional fishery scientists as a source of inspiration.

A Report on the Development of the Fresh Water Fisheries of South Korea, by Charles L. Fugua, 23 pp., illus., processed. Office of the Economic Coordinator Korea, Division of Agriculture, Branch of Fisheries, Seoul, South Korea, May 1958.

A study and evaluation of the fresh-water fishery resources of South Korea was made to assist the Korean Government in its programme to secure greater food production. This study includes information on the species of fresh-water fish; the carp fishery and the possibility of producing about 220 million pounds of carp annually; fish production in water impoundments; the salmon fishery; trout; eels and other species; and *Tilapia.* Fish culture and management, research and education, construction of new hatcheries, and related subjects are also discussed. The report contains definite conclusions and recommendations regarding the future development of the fresh-water fisheries and presents a basis for the development of a fresh-water fisheries programme for South Korea.

Fresh-water Crayfish in Netherlands New Guinea Mountains, by L.B. Holthuis, article, SPC Quarterly Bulletin, vol. 8, no. 2, April 1958, pp. 36-39, illus., printed, single copy 30 US cents. South Pacific Commission, Noumea, New Caledonia.

Reports on the fresh-water crayfish resources of the Wissel Lakes region of Netherlands New Guinea. The article is especially timely since the South Pacific Commission has begun to explore the possibilities of introducing new species of edible pondfish to this area.

Purpose and Methods in Fishery Statistics (Report of the First International Meeting on Fishery Statistics held in Copenhagen, Denmark, 26th-30th May 1952), edited by G.M. Gerhardsen, 371 pp., printed in English with a few papers in French. Food and Agriculture Organization of the United Nations, Rome, Italy.

The purpose of this report is to give a detailed account of the first International Meeting on Fishery Statistics, which was organized by the Food and Agriculture Organization of the United Nations in Copenhagen, Denmark, on May 26-30, 1952. The report is based on papers which were written for the meeting of purposes and methods in fishery statistics. The discussions and papers have been grouped under the following chapters: (1) Introduction and Summary Report; (2) The Need for Fishery Statistics and the Degree of Accuracy Required; (3) Collection of Fishery Statistics; (4) Fishing Craft Statistics; (5) Statistics on Fish Processing, Marketing and Distribution; (6) Fishery Products in External Trade Statistics; and (7) Presentation of Fishery Statistics with Special Reference in International Comparison. "The participants in the meeting came largely from Europe and North America, but many of the problems referred to are universal,

and, "states the editor, "it is hoped that this symposium on fishery statistics will be found useful in all progressive fishery countries of the world. Current interest in the development of fisheries which is likely to become even more marked in the years to come, points to the indispensable need for accurate statistics for which a thorough knowledge of the purpose and methods is an obvious prerequisite. It is for this reason that this report, though essentially a record of the proceedings of a meeting is being made available not only to participants but to all interested in its subject matter".

Davis, F.M. **An account of the Fishing Gear of England and Wales.** *Fishery Investigations* (Her Majesty's Stationery Office, London. Series 2, Vol. 21 No. 8, Sept. 165 pp., 111 illus. In English. Price £1-15-0.

This monograph is stated to be the most authoritative publication on the fishing gear of England and Wales. The first edition of the book was originally published in March 1923. New types of gear have been added and modern developments particularly regarding the trawls are incorporated. The introductory chapter consists of: Possible lines of origin of various types of gear, Principles of fishing, Classification of Gear. The nomenclature of netting and mending of nets, material preservation etc., are discussed in Chapter 2. Chapters 3 and 4 deal with fishing gear such as barrier, set nets, stow nets, fixed gill nets and trammel nets. The Chapter 5 describes Drift nets for fishing Sprat, Pilchard, Mackerel, Herring, Salmon and Sea Trout. The 6, 7 and 8 Chapters deal with the Seines and the Drag nets which include the various forms of Purse Seines, and trawls such as Otter Trawl, Beam Trawl, Danish Seine, Dredges, Working of Trawls. Chapter 9: The various forms of the Baited Traps and includes the Pots, Hoop Nets, Lift Net, Hand-lines, Longlines. Chapter 10 deals with the Push nets, Fish Spears and Gear for catching Shellfish. Chapter 11 deals with certain aspects of fisheries management such as the saving of undersized fish. This is followed by a classified bibliography of some 140 references. There is a subject index. The various types of gear are fully described and explained with the help of a large number of illustrations (111 illus.).

INTERNATIONAL MEETINGS

FISHERY STATISTICIANS TO MEET IN EDINBURGH

International Conference in September

An international meeting of experts on fishery statistics in the North Atlantic area is to be held in Edinburgh next September at the invitation of the United Kingdom Government.

The Conference is being convened by the Food and Agriculture Organization (FAO) of the United Nations in cooperation with the International Commission for the North West Atlantic Fisheries and the International Council for the Exploration of the Sea.

Governments concerned with the North Atlantic fisheries have been invited to nominate experts directly con-

cerned with collecting, analysing and publishing statistics on the fishing industries and trades of their countries and the Scottish Home Department will act as host to the delegates of whom about 50 or 60 are expected to attend the Conference.

The meeting will be of interest not only to officials but also to biologists, economists, and fishing industry executives.

It is hoped that delegates will be able to identify the main difficulties encountered in providing statistical data for the use of Governments, international agencies and the fishing industry and will indicate the action to be taken to eliminate or reduce such difficulties.

Fishery statisticians are faced with an ever growing demand for more numerous and more detailed statistical data and will attempt at the Conference to work out with the users further means of simplifying their task. It is also hoped that delegates will be able to say how to standardise both national and international fishery statistics to make them more useful.

In addition to holding plenary sessions, the Conference will work through two committees. The first will deal with fish catching statistics and the second will be concerned with fish processing, distribution and consumption statistics. Working and background papers for the meeting are being prepared by the sponsoring bodies and by various participating countries.

This will be the second international meeting on fishery statistics. The first was organized by FAO and held in Copenhagen in May 1952. The Edinburgh meeting will be held in the Government Buildings at Saughton and will carry forward international cooperation in fishery statistics which was stimulated by the Copenhagen meeting. It will start on Tuesday, September 22 1959, and is expected to end on Wednesday, September 30, but, if desirable, the meeting will be extended to Friday, October 2.

Fishery Cooperatives Meeting Opens At Naples

The first Technical Meeting on Fishery Cooperatives, convened jointly by the FAO and the International Labour Organization (ILO), was officially opened at Naples on 12 May by Mr. M. Jervelino, Italian Minister of the Merchant Marine. Mr. Malfettani, Secretary-General of the Italian Cooperative Confederation (CCI) was elected chairman of the Meeting, and Mr. A. Alloy of France and Mr. K. Bahr of Germany were elected vice-chairmen. Mr. Jerveline, in his opening speech, said that fishermen must organize themselves into cooperatives in order to increase their technical and financial means, must adopt new systems to harvest the biological resources of the sea, and must rationalize their activities, reduce costs and increase their competitive position in the fish market. "This Conference should make clear the moral, technical, economic and social advantages of fishery cooperatives," he said.

Dr. D.B. Finn, Director of FAO's Fisheries Division, said it was the first international meeting of the kind, and "though most of you have clearly similar interests in the development of fishermen's cooperatives, few amongst you have ever acted before. "In planning our

work," he said, "we should bear in mind also that the result of our discussions will be of interest not only to ourselves, but particularly to many of our friends in less-developed countries who are confronted with the urgent problems of developing their fisheries."

Mr. Malfettani said that, particularly in the field of fisheries, the only possible solution to problems confronting producers and consumers is the establishment of cooperatives. "I hope that governments will increase their support to the cooperatives without endangering their autonomy and independence," he concluded. The ILO representative, Mr. G.N. Lamming, said that ILO and FAO are concerned both with problems of fishermen and questions concerning cooperatives. The important thing, however, is that a start will have been made, and since the cooperative movement is not a static edifice but a living organism, the question which we shall be discussing will almost certainly prove to be of perennial interest."

Seventy-five delegates from 18 countries (Belgium, Canada, France, Western Germany, Greece, Italy, Japan, the Netherlands, Norway, Poland, Spain, Sweden, Switzerland, Turkey, the United Kingdom, the United States of America, Viet-Nam, Yugoslavia) and observers from several international organizations (ICA, International Federation of Agricultural Producers, the Indo-Pacific Fisheries Council, the General Fisheries Council for the Mediterranean) attended the nine-day meeting. A number of study tours are on the agenda, as well as visits to Cooperative Societies concerned with marine fishing and shell-fish cultivation, situated in the Gulf of Naples.

The following seventeen Papers were read at the Meeting:

1. Fishery Cooperatives in Europe by Margaret Digby.
2. Fishery Cooperatives in North America by Louis Bérubé.
3. Le Credit Maritime Mutuel en France présenté par la Direction des Pêches maritimes, Marine marchande, Paris.
4. Cooperative Credit in the Fishing Industry in Japan.
5. Distributive System and Cooperative Marketing of Fishery Products in Japan by Akira Hasegawa and Hirohiko Watanabe.
6. The Organization and Activity of a Multi-purpose Society of Cooperative Character in the German Federal Republic by F.W. Weisse.
7. The Insurance System for the Coastal and Small Deep-sea Fisheries (Cutter Fishery) in the German Federal Republic by H. Wiehr.
8. The Organization and Activities of Fishery Supply Cooperatives in the German Federal Republic by G. Marre.
9. The Organization and Activities of a Fish Marketing Cooperative in the German Federal Republic by G. Marre.
10. A General Survey of the Development of Cooperation among Fishermen in Norway

and Methods by which the Government has assisted the Organizations by Aslak Aasbö.

11. Education and Training for Fishermen's Cooperatives submitted by International Labour Office, Geneva.
12. Cooperative Insurance for Fishing Vessels in England and Wales by John Thomson.
13. Business Organization and Management of Fishery Cooperatives submitted by International Labour Office, Geneva.
14. Organization and Management of Fishery Cooperative Associations in the United States by Leslie D. McMullin.
15. A Note on the Legislation on Fisheries Cooperative Associations in Japan.
16. Housing Schemes for Fishermen in Schleswig-Holstein, German Federal Republic by G. Marre.
17. Notes sur la Cooperation chez les Pecheurs en Italie présentées par la Confederation Cooperative Italienne.

Fisheries and Disposal of Atomic Wastes

Warnings of possible dangers resulting from the disposal of radioactive wastes from atom factories, now and in the future, were sounded September 11 at a session of the Second United Nations International Conference on the Peaceful Uses of Atomic Energy at Geneva. Half of 56 papers on 'environmental aspects of large-scale uses of atomic energy' submitted dealt with the oceans and their use as a kind of radioactive rubbish dump.

Dr. B.H. Ketchum (United States), in a paper dealing with researches into the biological factors involved in dumping radioactive wastes, pointed out that many of the radioactive isotopes would be incorporated in the marine biological system and would be transferred from organism to organism in the various steps of the food-chain.

One of the arguments for disposing of waste products in the depths of the ocean was that it would take centuries for the bottom layers to mix with the upper layers and that in that time most of the activity would have died. Dr. Ketchum, however, altered this picture by introducing a kind of biological 'elevator'.

He showed how plant and animal life in the sea would pick up and concentrate radioactivity at one level and move vertically, or horizontally, taking it with them. The radioactivity could thus be transferred upward or downward, regardless of the physical transport of the currents. Moreover, when the sea life which had concentrated the radioactivity died, the radioactive remains would sink toward the bottom. He insisted that far more work should be done on the study of this accumulation and transfer of contamination through the biological system.

Another warning was delivered by Dr. E.M. Kreps (U.S.S.R.) who reported on Soviet investigations of deep-sea trenches in the world's oceans. There are 19 such trenches whose depths

exceed 4.5 miles. Some of them are hundreds and even thousands of miles in length. Fifteen of them are in the Pacific, one in the Indian Ocean and three in the Atlantic Ocean.

The U.S.S.R. has investigated 12 of these trenches and the report contended that they were unsuitable places for the disposal of radioactive waste. The assumption that they were stagnant ponds in the oceans was untrue because investigation had shown that the mixing of the upper and lower waters could take place in as short a time as five years.

He produced evidence of change in temperature, the distribution of oxygen and phosphate, and the character of the organic life of the Tonga trench which runs southward for nearly 800 miles from the Samoan islands and which had been regarded as one of the likeliest 'dumps'.

He concluded by stating, "The radioactive waste compounds dumped into the trench and dissolved will inevitably be brought to the upper layers of the ocean on which man depends for his food. Consequently the dumping of radioactive materials in deep-sea trenches will constitute a real menace in the very near future.

TILAPIA IS REALLY GOING PLACES... IT MIGHT WIND UP IN THE MOON

Tilapia, an East African lake fish, may share with man the honor of being the first earth creature to live on the moon.

Prof. Albert K. Sparks, Associate Professor of the Fisheries School, University of Washington, Seattle, has written to the Uganda game and fisheries department describing experiments aimed at breeding tilapia in space.

Providing food for astrounauts on their long voyages is a major problem facing space scientists. Carrying bulk supplies at take-off could mean almost doubling the size and weight of the vehicle.

One answer is: grow food in space.

The Washington University experiments are aimed at producing a closed cycle of tilapia breeding in a sealed aquarium. The tilapia has a high protein value, it breeds easily and grows quickly, it lives on algae, minute vegetable organisms which float in water and grow by synthesizing sunlight. The algae give off oxygen.

If the experiments succeed, a tilapia tank might become standard spaceship equipment. Alternatively, sealed aquaria might be sent up separately for use as food stores by passing ships.

Bathed in perpetual sunlight, the algae would multiply and keep the water supplied with oxygen. The fish would eat the algae and astrounauts would eat the fish.

Aloy Achieng, a Uganda Fisheries Development Officer, who is studying for his degree at Seattle, wrote: "*Tilapia* is becoming important in this part of the world. The Americans wish to use it as a food in space for men traveling to the moon and beyond in the near future."

(From: *Philippines Herald*, 31 May 1959)

FORTHCOMING CONFERENCES, MEETINGS AND TRAINING CENTRES

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
April 5 – 10	*FAO 2nd World Fishing Boat Congress	Mr. J.O. Traung Secretary, Fisheries Division, FAO, Rome.	Rome
14 – 16	CIBA Foundation – 5th Colloquium on Ageing: The Life Span of Animals	Dr. H.N.H. Genese Deputy Director, The CIBA Foundation, 41 Portland Place, London, W. 1	London
29 – 2 – 3 weeks	4th South Pacific Conference	South Pacific Commission Post Box 9, Noumea, New Caledonia	Malaguna, (Rabaul) Papua and New Guinea
May Undet.	The Baltic and International Maritime Conference — General Meeting	—	London
12 – 21	*Technical Meeting of Fishery Co-operatives	Mr. F.E. Popper Fisheries Division, FAO, Rome.	Naples
May 19 – 22	ECE Working Party on Transport of Perishable Food-stuffs	Secretary, Economic Commission for Europe, ...	Geneva
June 15 – 20	International Congress on Combustion Engines (CINAC, – 5th Congress	—	Wiesbaden Germany
22 – 26	International Whaling Commission – 11th Meeting	Secretary, International Whaling Commission, c/o Fisheries Department, Ministry of Agriculture, Fisheries and Food, 3 Whitehall Place, London, S.W. 1.	London
Undet.	Carribean Seminar on Fisheries – 3rd Seminar	Executive Secretary, Gulf and Caribbean Fisheries Institute, Marine Laboratory, University of Miami, Coral Gables – 34, Florida, U.S.A.	San Maarten, Antillas, Holandesas

* Indicates Meeting to which IPFC has been officially invited.

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
August 19 – 26	International Institute of Refrigeration – 10th International Congress	Secretary, International Institute of Refrigeration, 177 Boulevard Malesherbex Paris 17e.	Copenhagen
20 – 8 Sept.	14th International Limnological Congress	Dr. T.T. Macan General Secretary and Treasurer, International Association of Limnology, c/o Freshwater Biological Association, Ferry House, Ambleside, Westmorland, England	Vienna
30 – 12 Sept.	International Oceanographic Congress	American Association for the Advancement of Science in Co-operation with UNESCO, the Special Committee on Oceanographic Research of ICSU, and FAO Dr. Mary Sears Chairman, Committee on Arrangements, Woods Hole Oceanographic Institute, Woods Hole, Mass., U.S.A.	New York
September 12 – 21	*FAO World Scientific Meeting on the Biology of Sardines and Related Species	Mr. H. Rosa, Jr. Fisheries Division, FAO, Rome.	Rome
2nd half	ECAFE – Working Party on Small-scale Industries and Handicraft Marketing-Canning and Bottling of Fruits and Food in Co-operation with FAO	Executive Secretary, Economic Commission for Asia and the Far East, Sala Santitham, Rajadamnern Avenue Bangkok, Thailand.	Undet.
22 Sept. – 2 Oct.	Expert Meeting on Fishery Statistics in the North Atlantic Area	Fisheries Division, FAO, Rome.	Edinburgh
28 Sept. – 2 Oct.	ECE – Working Party on Standardization of Perishable Foodstuffs – 10th Session	Executive Secretary, Economic Commission for Europe, Palais des Nations, Geneva	Geneva

* Indicates Meeting to which IPFC has been officially invited.

Date	*Subject of Conference*	*Convening Body and/or Organizers*	*Location*
October	CCTA – Symposium on Biology and Maritime Fisheries of the East African Coast	Executive Secretary Commission for Technical Co-operation in Africa, South of the Sahara	Cape Town
	CCTA – Symposium on Sea Fisheries on the West Coast of the Indian Ocean	,,	Cape Town
	CCTA – Meeting of Specialist on Hydrology	,,	Ghana
–	European Inland Fisheries Advisory Commission	Fisheries Division, FAO, Rome	Dublin
November 2 – 26	FAO Conference – 10 Session	–	Rome

FAO TRAINING CENTRES AND SEMINARS

1959

1 – 8 Aug.	FAO Seminar on Food Technology for Asia and the Far East	Dr. S.S. De Regional Nutrition Officer, FAO, Bangkok	Mysore
17 Aug. – 18 Sept.	International Training Centre on Fishery Statistics for the Mediterranean African, and the Near East Region	Mr. F.E. Popper Fisheries Division, FAO, Rome	Copenhagen
9 Nov. –	International Training Centre on Fishery Surveys	Dr. G.L. Kesteven Fisheries Division, FAO, Rome.	Tanga

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IMPORTANT IPFC PUBLICATIONS

PROCEEDINGS (Records of Council Sessions, normally held once every 18 months)

First Meeting, Singapore, 24 - 31 March 1949
- Section I: Report of Proceedings
- Section II: Working Papers
- Section III: Contributed Papers
- Section IV: Symposium Papers

Second Meeting, Cronulla, N.S.W., Australia, 17-28 April 1950
- Section I: Report of Proceedings
- Section II: Technical Papers
- Section III: Symposium Papers

Third Meeting, Madras, India, 1-16 February 1951
- Section I: Report of Proceedings
- Section II: Technical Papers
- Section III: Symposium Papers

Fourth Meeting, Quezon, Philippines, 23 October - 7 November 1952
- Section I: Report of Proceedings
- Section II: Technical Papers and Symposium Papers

Fifth Meeting, Bangkok, Thailand, 22 January - 5 February 1954
- Section I: Report of Proceedings
- Section II: Technical Papers
- Section III: Symposium Papers

Sixth Session, Tokyo, Japan, 30 September - 14 October 1955
- Section I: Report of Proceedings
- Section II: Technical Papers
- Section III: Symposium Papers

CURRENT AFFAIRS BULLETIN (Quarterly)

No. 1-23, July 1951 - December 1958

SPECIAL PUBLICATIONS (Irregular)

No. 1: Schuster, W.H. (1952). Fish Culture in Brackish-water Ponds of Java. 1-143 pp.

No. 2: Anonymous, (1952). Fish Culture in Indonesia. 1-126 pp.

No. 3: Zaneveld, J.S. (1955). Economic Marine Algae of Tropical South and East Asia and their Utilization. 1-55 pp.

No. 4: Anonymous, (1958). Annotated Bibliography on Fishing Gear and Methods.

OCCASIONAL PAPERS (Irregular, Mimeo)

No. 52/3 Annotated Bibliography on the Culture of Milkfish, *Chanos chanos* (Forskal), by Walter H. Schuster.

No. 52/9 Control of the Quality of Salted Dried Fish, by M. Lafont.

No. 52/10A. Bibliography of Fishing Gear Preservative, by B.Y. Datingaling and J.I. Sulit.

No. 54/1 The Status of the Fisheries in River Basin Development, by C. Miles and T.J. Job.

No. 55/2 Sampling Methods used in Japanese Fisheries Catch Statistics, by T. Yamamoto (Printed).

No. 57/1 Documents published by and otherwise contributed or presented to IPFC through 1948-1956.

No. 59/3 Synopsis of Biological Data on Milkfish *Chanos chanos* (Forskal), 1775, by W.H. Schuster.

MISCELLANEOUS

Directory of Fisheries Institutions—Asia and the Far East.